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# The EDHEC European ETF Survey 2015

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**Amundi**  
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ETF  
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SMART BETA



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# Executive Summary: Ten Key Conclusions from the Survey



# Executive Summary: Ten Key Conclusions from the Survey

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## Introduction

EDHEC-Risk Institute conducted its 9th survey of European investment professionals about the usage and perceptions of ETFs at the end of 2015. The aim of this study is to analyse the usage of exchange-traded funds (ETFs) in investment management and to give a detailed account of the current perceptions and practices of European investors in ETFs.

There are a number of studies on the ETF industry in Europe. A key advantage of employing a survey methodology is that we obtain direct information from market participants, not only about the instruments they currently use, but also how these instruments fit into their overall investment process, and how they are evaluated. Moreover, in addition to current usage, we are able to harness information concerning the future plans of investment professionals, thus providing an outlook of probable industry developments.

The industry has undergone rapid growth since inception. The first ETFs appeared in the United States in 1989 and they started trading in Europe in 2000. Assets under management (AUM) of ETFs and other exchange-traded index products in Europe amounted to \$461bn as at the end of September 2015 (ETFGI, 2015).

In this executive summary, we provide key conclusions from responses provided by 219 European investment decision-makers, 180 of which were ETF users. The survey respondents were from 25 different countries, with 52% of them being from the UK, Switzerland and Italy. Institutional managers, who accounted for 76% of the survey participants, are the largest group represented in the study and more than half of the respondents (51%) are asset managers. Detailed results for the survey

as well as the survey methodology and a background on ETFs are available in the main body of the document.

The Background section, which constitutes the first part of this document, analyses how different types of ETFs are designed, what advantages they offer, and the risks they are exposed to. The second part of this document focuses on the results of the survey. Responses provide interesting insight into the general appreciation of ETFs, and also help to confirm a long-term trend established in our past surveys since 2006. Indeed, we are now able to provide data over a ten-year period that shows a stable and high level of satisfaction with products, as well as an increasing appetite to rely on ETFs for ever more aspects of portfolio management. Moreover, we observe a recent increase in interest for ETFs that track smart beta indices. When it comes to smart beta ETFs, investment professionals, however, also have strong quality requirements for the underlying indices, most notably in terms of transparency.

The present summary highlights the ten key conclusions that have been drawn from our research.

## **1. ETFs are used frequently and make up an increasing proportion of portfolio holdings across asset classes**

Over the past decade, we have observed a sign of increasing propagation of the adoption of ETFs and ETF-like products among survey respondents (see Exhibit 1). Since 2006, the increase of the percentage of respondents using ETFs in traditional asset classes has been spectacular. In 2006, there were 45% of respondents using ETFs to invest in equities, compared with 91% in 2015. With regard to government and

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corporate bonds, we went from 13% and 6%, respectively, in 2006, to 60% and 64%, respectively, in 2015. A dramatic increase from 15% of respondents in 2006 to 82% in 2015 has been also observed for commodities, while the share of respondents using ETFs to invest in real estate evolved from 6% in 2006 to 44% in 2015.

Since last year, we have observed a particularly large increase in the use of ETFs for investing in bond asset classes for both government and corporate bonds. In 2014, 48% and 53% of respondents used ETFs to invest in government and corporate bonds, respectively, compared with 60% and 64% of respondents in 2015. This increased ETF use is likely related to the high level of satisfaction observed over several years, with government bonds enjoying a satisfaction rate of around 90% since 2012, and corporate bonds enjoying a satisfaction rate ranging from 80% to 90% since 2011 (see Exhibit 3). A large increase in the use of ETFs for investing in commodities was also observed between 2014 (71% of respondents) and 2015 (82% of respondents). The equity class showed quite a stable rate in the use of ETFs for

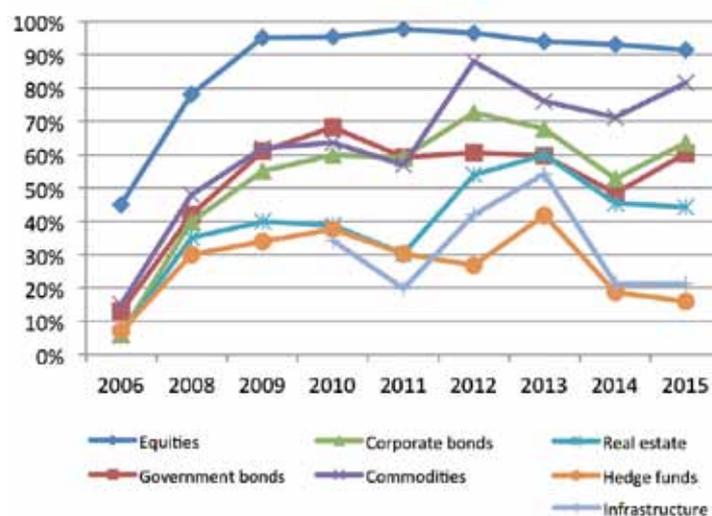
some years. Other asset classes, such as real estate or infrastructure, exhibit a rate of use comparable to that of last year, after several years of large variation from one year to another. The hedge fund class exhibits a decrease in the use of ETFs compared to 2014 (16% of respondents in 2015, versus 19% in 2014). However, this decrease is very small compared to the one encountered between 2013 (where the rate of use was 42%) and 2014, which might suggest that this rate of use is becoming more stable for this asset class. It appears that, with the exception of hedge funds and infrastructure, all rates of use are quite high.

To complement the analysis of the fraction of respondents that use ETFs within each asset class, Exhibit 2 compares the fraction of our respondents' portfolios invested in ETFs.<sup>1</sup> In this exhibit, the usage of ETFs or ETF-like products refers to the density of usage in each asset class. While the equity asset class is the one most widely used for ETF investment by investors, it is currently not the asset class with the highest proportion or density of ETF investment. In 2008, 22% of the investment in the equity asset class

1 - Since this question was not asked in the EDHEC European ETF Survey 2006, we can only provide a comparison with answers from 2008 to 2015.

Exhibit 1: Use of ETFs or ETF-like products over time

This exhibit indicates the use of ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.



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was made using ETFs, compared to 30% in 2015. As for government and corporate bonds, the increase in the proportion of ETF investment is more spectacular, having respectively accounted for 10% and 7% of total investment in 2008, compared to 27% and 31% in 2015. The increase in the use of ETFs to invest in commodities and real estate has also been particularly significant during this period, with the former having 16% of total investment accounted for by ETFs in 2008, compared to 45% in 2015; as for real estate, in 2008 it had 7% of total investment accounted for by ETFs, compared to 37% in 2015.

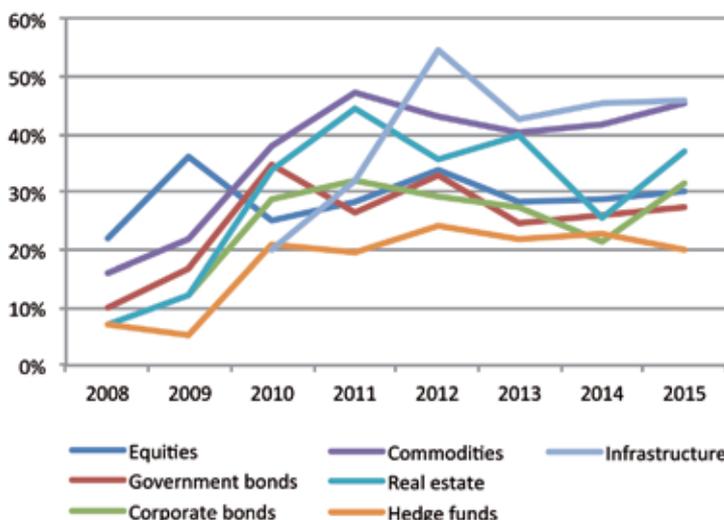
In 2015, we observe that six out of seven asset classes have noted a gain in their ETF market share, compared to the previous year. This gain is slight for equities, government bonds and infrastructure (1% for each of them) as well as for commodities (3%), which suggests that users have reached a satisfactory level of ETF usage for these asset classes and are not looking to expand their use beyond this level. On the other hand, this gain is quite high for corporate bonds (10%) and real estate (11%), for which significant decreases had been observed the

previous year (-6% and -14%, respectively). Meanwhile, hedge funds have experienced a 3% decrease in their ETF market share, after having seen a slight increase of 1% the previous year.

## 2. Satisfaction rates for ETFs in liquid asset classes are stable at high levels

Satisfaction with standard ETFs has generally remained at high levels for traditional asset classes, as shown in Exhibit 3. Compared to 2014, there has been increase in satisfaction with equity ETFs, which now enjoy a satisfaction rate of 98%, compared to 91% in 2014. The stable and high rate of equity ETF satisfaction, which has consistently been in the region of 90% since our first survey in 2006, may be due to the greater consensus for equity indices. Equity indices have the longest history of development and the most number of innovations, as do equity ETFs. Investors are therefore more familiar with equity indices as well as their drawbacks. Given the large variety of alternative weighting schemes for equity indices, investors have a wide range of products to invest in. Some

*Exhibit 2: Percentage of total investment accounted for by ETFs or ETF-like products*  
 This exhibit indicates the percentage of total investment accounted for by ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey from 2008 to 2015.



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asset classes that fall among those with the highest satisfaction rates in terms of ETF use have encountered moderate decreases in their satisfaction rate – these include the likes of government bonds (89% in 2015, versus 94% in 2014) and corporate bonds (81% in 2015, versus 90% in 2014). That said, their satisfaction rates still remain quite high. The government bond ETF satisfaction rate has fluctuated within the 80% to 90% range since 2006. For corporate bonds, the lowest value observed was in 2009, with a satisfaction rate of 61%. Since 2011, no values lower than 80% have been observed.

On the contrary, satisfaction rates for alternative asset class ETFs are either much lower, such as that of commodities ETFs (65% in 2015), or much more unstable over time, such as that of real estate and infrastructure ETFs (even if the latter two seem to have stabilised at quite a high satisfaction rate of around 85%, ever since 2012 for real estate and since 2014 for infrastructure), or both lower and unstable, such as that of hedge fund ETFs (36% in 2015), which exhibits the most spectacular variation with a decrease of 25% compared to last year. Since the beginning of our period of observation in 2006, the hedge fund ETF satisfaction rate has been one of the more volatile – a characteristic shared infrastructure ETFs, which we began observing in 2010. It clearly seems that the less liquid and less mature ETF markets experience the most varying levels of satisfaction. The rate of satisfaction for hedge fund ETFs clearly displays a saw tooth shape, with high figures in 2008, 2010, 2012 and 2014 (58%, 65%, 52% and 62%, respectively) and lower figures in 2006, 2009, 2011, 2013 and 2015 (27%, 28%, 40%, 33% and 36%, respectively). This may be due to the suitability of ETFs to more liquid asset classes or the fact that investor expectations are still adjusting

with regard to the benefits and drawbacks of ETFs based on those asset classes. For instance, we observed large variations through years in the number of users of ETFs for these two asset classes, as well as in the share of investment dedicated to ETFs, with a decrease in the use of ETFs coupled with a considerable increase in the satisfaction rate, which may indicate that dissatisfied users have stopped using ETFs for these asset classes. Since 2014, the number of ETF users for these two asset classes, as well as the share of investment dedicated to ETFs has tended to show more stability, especially for infrastructure, which may explain why we are simultaneously observing a stabilisation in the satisfaction rate for infrastructure ETFs.

However, it should be noted that the sample of respondents who indicated their level of satisfaction with infrastructure ETFs was very small, with only seven providing responses this year, similar to 2014. Similarly, the sample of respondents who answered whether or not they were satisfied with hedge fund ETFs was also quite small, with only 11 providing responses in 2015 and 13 in 2014. As a result, the impact of a single respondent having a change of opinion since last year has a considerable impact on the result.

The satisfaction rates for ETFs based on the most liquid asset classes are far more consistent compared to those based on illiquid asset classes. These results suggest the existence of challenges faced by product providers in replicating indices or finding relevant indices for illiquid asset classes. In particular, while long only (and thus easy-to-implement) exposure to standard asset classes such as stocks and bonds provides access to a number of well-documented risk premia (such as the equity risk premium for stocks, and the credit and term premium for

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bonds), many alternative asset classes do not necessarily give access to risk premia through long only investing. For example, it has been argued that long/short positions in commodity futures are necessary to capture risk premia in commodity markets, while long only exposure to commodity prices is not expected to give rise to any risk premium (see for example Fuertes, Miffre and Fernandez-Perez, 2013).

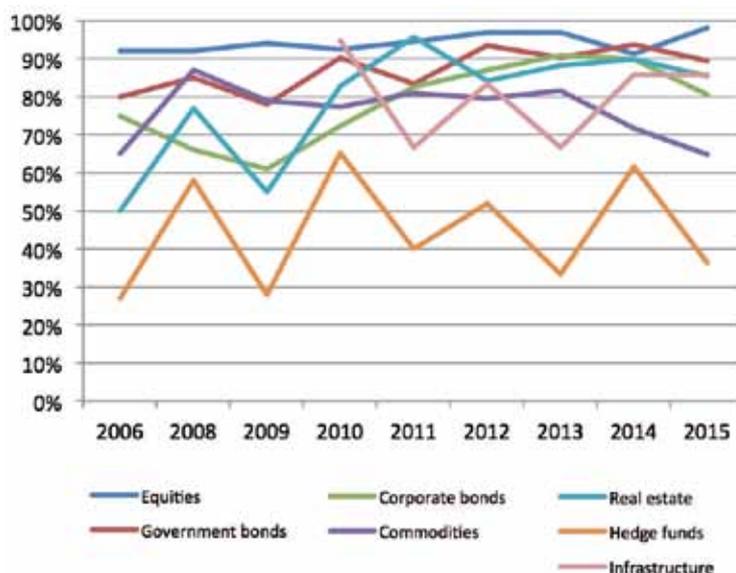
### 3. Investors recognise the high quality of ETFs when compared to competing indexing vehicles

Investors perceive ETFs to generally offer high tracking quality, with 97.6% of respondents evaluating ETFs' tracking quality as very good or fairly good (see Exhibit 4), a slightly higher percentage than in 2014 (97%).

It should be noted that respondents were only asked about tracking error. The tracking quality of ETFs may be characterised by several indicators, including not only the tracking error but also the tracking difference. The tracking difference is the

difference between ETF total return and the total return of the replicated index, while the tracking error evaluates the volatility of the difference in return between an ETF and its benchmark. Bonelli (2015) shows that depending on whether we consider the level of tracking error or the level of tracking difference, the ranking of ETFs that track the same index may differ greatly. For example, considering a collection of five ETFs that track the MSCI World Index, he observes that tracking error varies significantly across the different ETFs that track the same index (from 0.02% to 0.22%). The ETF with the lowest tracking error relative to the index has one of the highest tracking differences (-0.42%), and thus greatly underperforms its benchmark, while an ETF with one of the highest tracking errors (0.21%) also has the lowest tracking difference (-0.19%). Similar results were obtained for two other indices, namely the MSCI Emerging Markets Index and the MSCI Europe Euro Index. Bonelli (2015) concludes that tracking error is not representative of the under- or outperformance of ETFs with respect to their benchmark, but serves first of all to

*Exhibit 3: Satisfaction with ETFs or ETF-like products over time  
This exhibit indicates the percentages of respondents that are satisfied with ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.*



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evaluate the relative risk of daily deviations, and it is more a concern for short-term investors than for their mid-term or long-term counterparts. Long-term investors may be more interested in tracking difference, as its level provides information about ETF costs. Indeed, if ETF replication were perfect, the tracking difference would be equal to the ETF expense ratio. Thus, the lower the tracking difference, the lower the expense ratio.

## 4. Investors have a positive outlook on their future use of ETFs

Another interesting result from our survey is that respondents plan to further increase their use of ETFs (see Exhibit 5). We note that the percentage of respondents who plan to increase ETF usage is stable over time, at around 60% since 2011. In addition, in 2015, more than one third of the respondents (35%) will maintain their level of ETF usage,

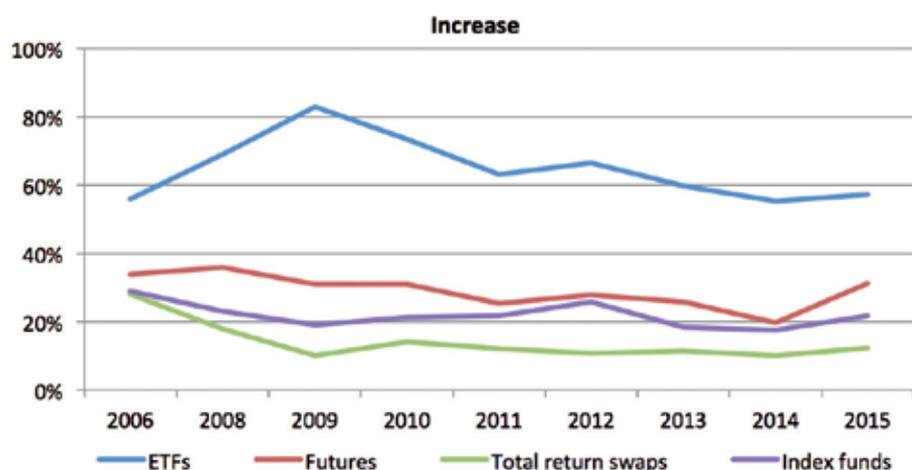
Exhibit 4: Summary of the scores for ETFs, futures, total return swaps (TRS) and index funds

This table indicates the average scores which the four products received from respondents based on the 11 criteria. For each particular quality, grades of 1 to 3 were given for answers of poor to very good and the average score was calculated based on the number of respondents who rated that question. The percentages indicate the respondents who answered "very good" or "fairly good" for each question, excluding non-responses. The numbers highlighted in bold indicate the highest score.

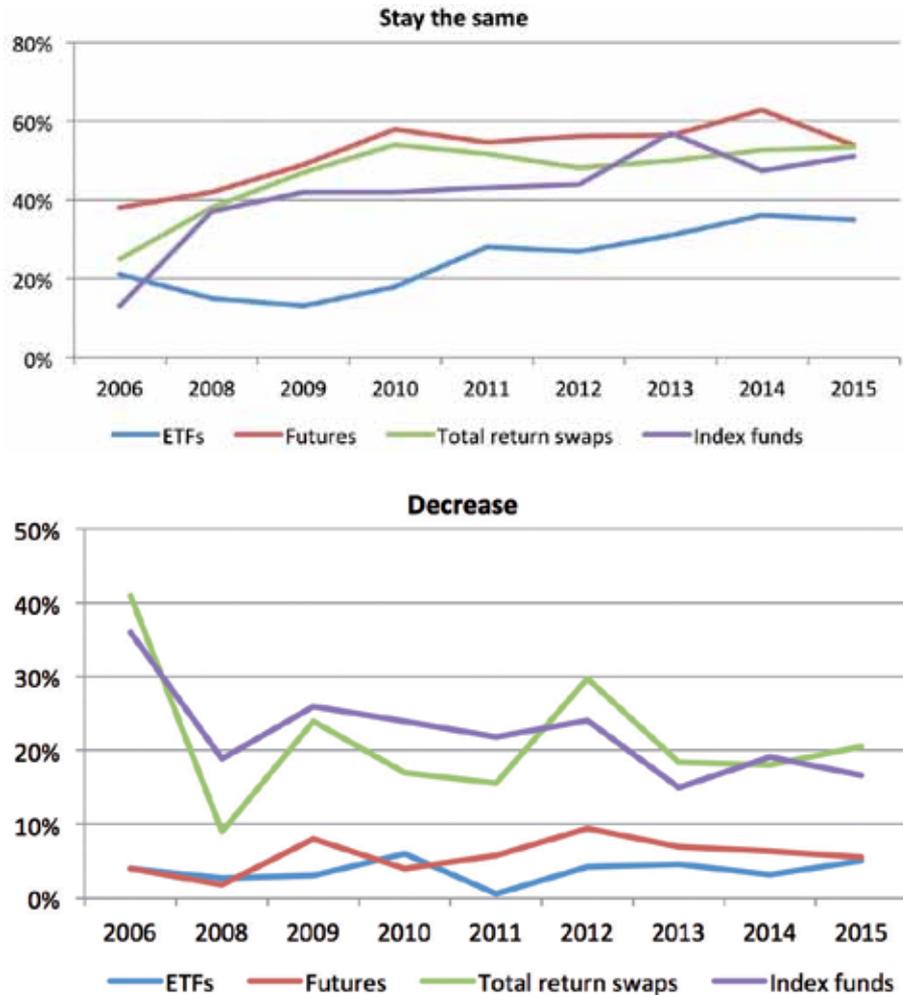
	ETFs	Futures	TRS	Index Funds
<b>QUALITY</b>				
Liquidity	2.43 (95.9%)	<b>2.81 (98.8%)</b>	1.78 (68.8%)	2.30 (93.9%)
Cost of liquidity	2.23 (93.6%)	<b>2.66 (96.9%)</b>	1.71 (64.3%)	2.11 (84.8%)
Other cost	2.35 (94.7%)	<b>2.62 (95.5%)</b>	1.80 (69.8%)	2.11 (81.1%)
Tracking error	<b>2.39 (97.6%)</b>	<b>2.61 (96.8%)</b>	<b>2.40 (93.6%)</b>	<b>2.28 (90.3%)</b>
Product range	<b>2.66 (96.4%)</b>	2.03 (79.2%)	2.00 (75.8%)	2.01 (79.9%)
Transparency	2.40 (94.6%)	<b>2.70 (96.1%)</b>	1.80 (65.0%)	2.27 (91.6%)
Minimum subscription	<b>2.78 (98.8%)</b>	2.21 (87.0%)	1.63 (54.8%)	2.34 (93.0%)
Operational constraints	<b>2.59 (95.2%)</b>	2.22 (83.8%)	1.53 (47.6%)	2.32 (92.3%)
Regulatory regime	<b>2.48 (98.2%)</b>	2.38 (91.7%)	1.69 (62.5%)	2.41 (94.2%)
Tax regime	2.21 (91.9%)	<b>2.34 (92.1%)</b>	2.00 (81.6%)	<b>2.24 (94.9%)</b>
Control of counterparty risk	2.15 (84.8%)	<b>2.52 (94.6%)</b>	1.65 (60.3%)	2.35 (92.9%)
<b>Average score</b>	2.42	<b>2.46</b>	1.82	2.25

Exhibit 5: Will you increase your use of the following indexing products?

This exhibit indicates the future potential to change each of the mentioned products by investors over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.



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and only 5% of respondents declare that they will reduce their usage. Moreover, this interest in increasing ETF usage can be contrasted with the lower percentage of investors who plan to increase their usage of other instruments such as futures (31%), index funds (22%), or TRS (12%). It thus appears that ETFs not only benefit from increasing interest in index investments, but also that ETF investors have a more favourable outlook of their usage than the usage of alternative indexing products.

## 5. Cost considerations appear to be the main driver behind increasing ETF allocations

In view of the results detailed in point 4, it is interesting to deepen investors' motivations for increasing their use of ETFs. As seen in Exhibit 6, increases in ETF allocation are first of all motivated by costs for a vast majority of respondents (80%), followed by performance (50%), transparency (46%) and then liquidity (45%). A comparison with 2014 results shows an increase in all criteria. These results are to be related with the deceiving performance of active management. Many academic papers were dedicated to the analysis of the ability of

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active management to deliver positive alpha and persistent performance. Among the recent studies, Barras, Scaillet and Wermers (2010), covering the period 1975 to 2006, found that more than 75% of actively managed US equity funds delivered a null performance after taking into account trading costs and expenses. Furthermore, 24% of the funds delivered negative alpha, while only 0.6% of them attained positive alpha after deducting fees. In addition, the authors noted a large decrease in the proportion of skilful managers over the past 20 years, with 14.4% of funds generating positive alphas in early 1990, compared with only 0.6% in late 2006. At the same time, an increase in the number of active funds generating negative alphas was observed, from 9.2% to 24.0%. In the same way, over the period from 1984 to 2006, Fama and French (2010) show that few active funds are able to produce returns high enough to compensate management fees.

In this context, investors may see the use of ETFs as more profitable and less costly than the use of active managers. ETFs allow investors to mimic the performance of all types of asset classes, including various smart beta products, while limiting costs. Indeed, investors are now offered a wide range of smart beta ETFs with the promise

of achieving performance at lower costs, compared to active management (see Osterland, 2015).<sup>2</sup>

## 6. ETFs are seen mainly as a substitute for active management

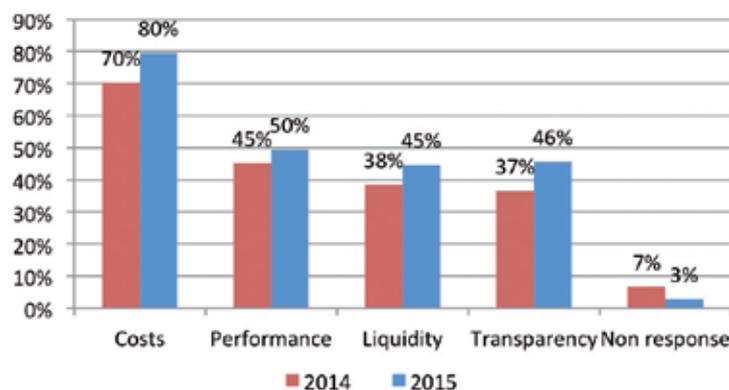
Increasing the use of ETFs will serve as substitute for the use of active managers for a vast majority of respondents (74%, versus 64% in 2014), while 64% (versus 42% in 2014) of them will substitute them in favour of other index products (see Exhibit 7).

Looking among the group of respondents who declare that their increase in the use of ETFs will serve as a substitute to the use of active managers, we found that 38% of them are investing in products that track smart beta (versus 37% for the whole sample, as displayed in Exhibit 9) and that 36% of them are considering investing in products that track smart beta in the near future (versus 33% for the whole sample). These results are coherent with the use of ETFs based on smart beta that seem to serve both to replace active managers and cap-weighted index funds, with a slightly higher frequency for the replacement of active managers than cap-weighted index funds.

2 - <http://www.cnbc.com/2015/10/06/smart-beta-and-stupid-fund-tricks.html>.

Exhibit 6: Increase in the use of ETFs is motivated by...

This exhibit indicates the motivations given by respondents for planning to increase their use of ETFs. More than one response could be given.



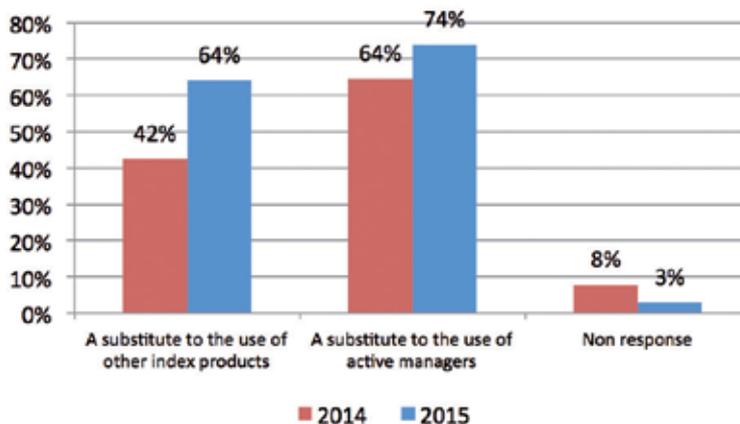
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In a recent paper, Malkiel (2013) argues that a considerable increase has been observed in the costs of active management in the United States over the period from 1980 to 2011. However, it appears that the fees charged by active funds were not compensated by higher performance for active funds than for passive funds. Rather, the amount of underperformance of active funds relative to passive funds was largely equal to the difference in fees between active and passive funds. Any increase in costs is thus perceived as a further loss of performance for investors. In view of our survey results, it is possible that the preference for ETFs shown by investors (who perceive them as low-cost tools and who have a tendency to replace active funds with ETFs) constitutes a coherent response to the increase of fees in the management industry as described by Malkiel (2013). This is all the more likely given that the leading reason investors give as a motivation for increasing ETF use is cost (see Exhibit 6). Investors now seem to be well aware of the effect of costs on long-term performance.

## 7. Investors allocate most resources to the appraisal of active managers, fewer resources to the evaluation of cap-weighted indices, and even fewer to the assessment of smart beta

From our results, it appears that the average percentage of time personally spent by respondents is consistent with the percentage of full-time staff involved in investment strategy evaluation. While respondents spent comparable amounts of their time evaluating passive management and active managers (21% and 23%, respectively), they only spent 15% of their time evaluating smart beta and systematic factor investments (see Exhibit 8). Differences are even greater when it comes to the percentage of full-time staff involved in evaluating the different forms of investment. While a quarter of full-time staff is dedicated to the evaluation of active managers, only 17% of full-time staff is employed for the evaluation of cap-weighted indices and passive investment products, and only 10% for the evaluation of smart beta or systematic factor investments. It is striking that the highest resource allocation is given to the evaluation of active managers. Moreover, a striking gap exists between the resources

Exhibit 7: Increase in the use of ETFs will serve as...  
 This exhibit indicates the reasons given by respondents for planning to increase their use of ETFs. More than one response could be given.



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allocated to smart beta evaluation and the resources allocated to evaluating either traditional active management or traditional passive management products. Resources allocated to smart beta product evaluation clearly lag behind. With the increasing popularity of smart beta products, more resources should be devoted to evaluating the various offers. However, our results suggest that investors do not necessarily have the adequate resources for smart beta, which is a more recent phenomenon and which constitutes a new category in between traditional passive and active management.

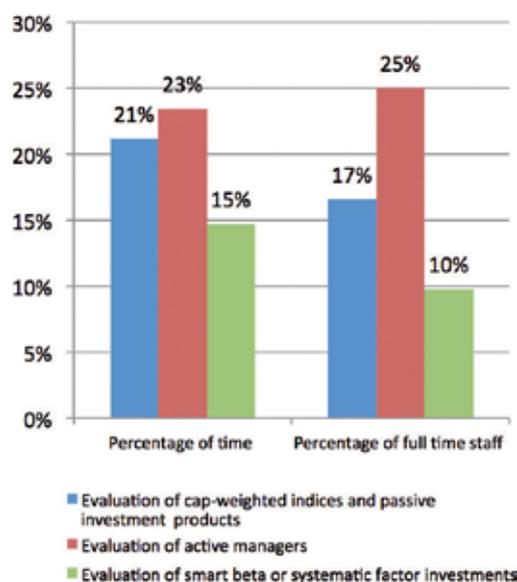
## 8. Investors show a keen interest in smart beta ETFs based on agreement with research results on the benefits of smart beta

For the third year, our survey includes information about respondents' use of products that track smart beta indices. It appears from the results that investors continue to show high and increasing interest for smart beta ETFs, and have strong

requirements for them. More than a third of respondents (37%) already use products that track smart beta indices, compared to 25% in 2014, and another third of them (33%) do not currently invest in such products but are considering investing in them in the near future (see Exhibit 9). These results imply that we are likely to see strong growth of smart beta ETF usage in the future.

We do not include results on the use of smart beta ETFs over time within the survey results (see Exhibits 1 to 3) as they are recent products and were only introduced into our survey in 2013. However, it is interesting to note the increase in the use of ETFs for smart beta investing, as well as the high satisfaction rate with ETFs within this asset class. In 2015, there were 68% of respondents who used ETFs to invest in smart beta, a considerable increase compared to 49% in 2014. Thus, by 2015 ETFs or ETF-like products accounted for 42% of total investment in smart beta, compared to 33% in 2014. The satisfaction rate indicated by respondents for smart

*Exhibit 8: Resources employed for the criteria of evaluation of investment strategies and products within your organisation  
This exhibit indicates the average percentage of time personally spent by respondents on evaluating passive investment, active managers and smart beta or systematic factor investments, respectively, as well as the percentage of full-time staff involved in the evaluation of passive investment, active managers and smart beta or systematic factor investments, respectively.*



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Exhibit 9: Use of products that track smart beta indices

This exhibit indicates the percentages of respondents that reported using products that track smart beta indices. Non-responses are excluded.

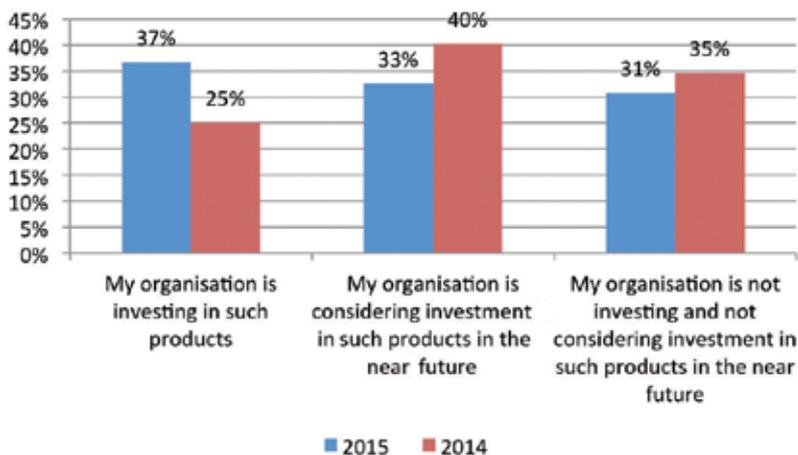
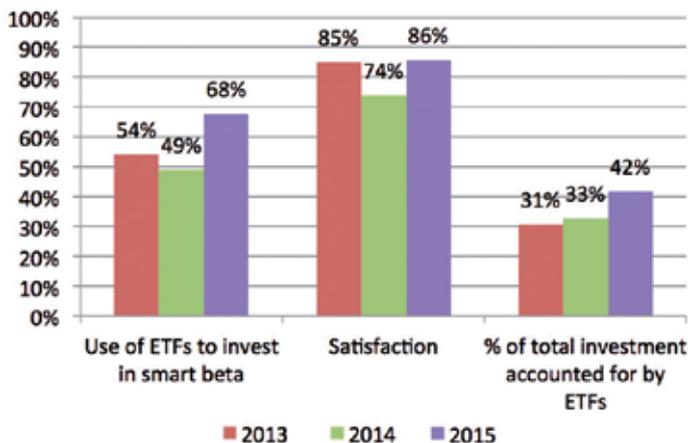


Exhibit 10: Smart Beta ETFs: Use and satisfaction

This exhibit indicates the use of and satisfaction with smart beta ETFs from 2013 to 2015.



beta ETFs also reached the high score of 86% in 2015, compared to 74% in 2014 (see Exhibit 10).

Additionally, ETFs based on smart beta indices represent the top concern of respondents when it comes to future developments, with 38% of them hoping for further developments in this area (see Exhibit 4.16 in section 4.1.7 of the Results section of this document).

This latter result is interesting as there have been a considerable number of product

launches in the area of smart beta ETFs (see Section 2.4 on smart beta ETFs in the Background section of this document). The fact that investors still see room for further product development may be explained by the fact that product launches have focused on relatively few popular strategies representing a small number of risk premia such as the value premium and defensive equity strategies. Indeed, the first generation of smart beta benchmarks were embedded solutions which did not distinguish the stock picking methodology from the weighting methodology. As such,

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they obliged the investor to be exposed to particular systematic risks which represented the very source of their performance (see Amenc, Goltz and Martellini, 2013). Given the increasing discussion on harnessing multiple factor premia from equity investing, including factors such as momentum, size and quality, among others, it is perhaps not surprising that investors see room for further product development. Indeed, with 33% of respondents wishing for future product development, ETFs based on factor indices are also among the most widely requested categories. In addition, the arrival of the Smart beta 2.0 offers yet increased investor interest for this type of product. The Smart beta 2.0 approach enables investors to explicitly choose exposure to systematic risk factors, as well as to choose the weighting scheme of the smart beta benchmark (see Amenc, Goltz and Martellini, 2013).

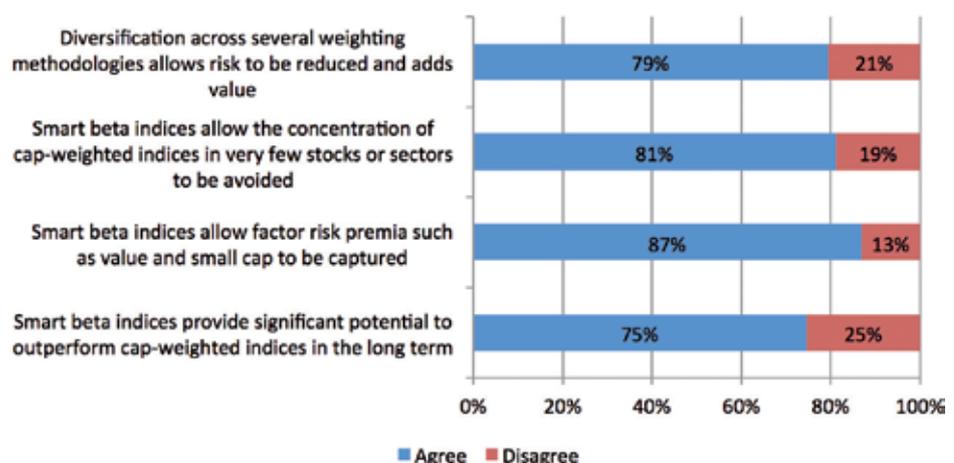
This large use of ETFs based on smart beta indices, as well as the wishes for additional development, may be explained by the favourable perception that respondents have of smart beta indices as tools for improving their investment process, as shown by their answers to further questions. As displayed in Exhibit 11, three-quarters of

respondents (75%) think that smart beta indices provide significant potential to outperform cap-weighted indices in the long term, and more than four out of five respondents (81%) think that they avoid cap-weighted indices that are concentrated in very few stocks or sectors. About the same proportion of respondents (79%) thinks that diversification across several weighting methodologies allows risk to be reduced and adds value, while 87% of respondents agree that smart beta indices allow factor risk premia, such as value and small-cap, to be captured. Thus, capturing factor premia is the prime motivation for investment in smart beta ETFs for a vast majority of respondents.

Interestingly, when asked about transparency, a vast majority of respondents (94%) agree that smart beta indices require full transparency on methodology and risk analytics (see Exhibit 12), a percentage even higher than the 88% obtained in 2014. Furthermore, almost half of them (49%) strongly agree with this statement, which represents a considerable increase on last year, where already more than one-third of respondents (37%) strongly agreed with the assertion.

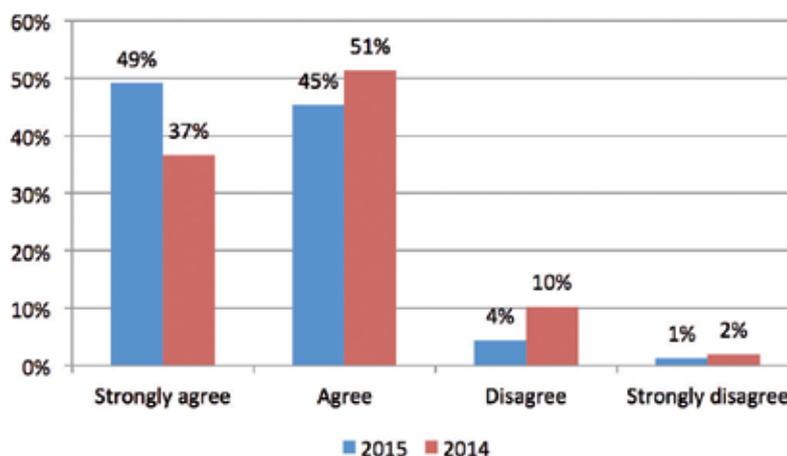
*Exhibit 11: Agreement of respondents with statements about smart beta indices*

*This exhibit indicates the percentage of respondents that agree or strongly agree with the statement about smart beta indices. Non-responses are excluded.*



## Executive Summary: Ten Key Conclusions from the Survey

*Exhibit 12: Do you think smart beta indices require full transparency on methodology and risk analytics? This exhibit indicates the percentages of agreement with this statement compared with 2014 results. Non-responses are excluded.*



These results confirm earlier research on the need for transparency of index investors in general. In particular, in a survey conducted among European investors concerning their perception of index transparency, Amenc and Ducoulombier (2014) found strong conviction among respondents that the transparency currently offered by index providers is, in general, inadequate. Moreover, their results show that the rise of strategy indices makes transparency even more important and that opacity undermines the credibility of reported track records, in particular for new forms of indices. When reviewing existing indices and their disclosure practices, Amenc and Ducoulombier (2014) find that a number of providers failed to disclose the full calculation methodology that would allow for replication of their strategy indices (e.g. formulae or procedures were not properly described or specified, proprietary or third party models were used but not provided). They also find that for smart beta indices used by UCITS, only three out of five index firms provided a full history of their index closing levels. In the EDHEC-Risk Alternative Equity Beta Investing survey, Amenc et al. (2015a) find similar strong evidence on severe shortcomings of alternative equity beta

strategies in terms of the transparency they offer investors. In fact, "limited information on risks" and "limited access to data" appear to be some of the biggest hurdles in terms of alternative equity beta adoption by investors. Moreover, when asked about the importance of different assessment criteria when evaluating advanced beta offerings, respondents saw transparency as one of the key criteria.

Transparency is not only the best protection against the risks arising from conflicts of interests, but it is also instrumental in improving the informational efficiency of the indexing industry. In view of the increased diversification and sophistication of the rapidly growing indexing industry, achieving informational efficiency should be a key priority. While transparency is important for market indices, i.e. indices that aim to represent a given market or segment, it is all the more so for smart beta indices. Indeed, while these new forms of indices can provide investors with improved risk-reward profiles or other benefits, they bring distinct risks of their own. Unfortunately, these indices' low level of transparency, which is routinely justified by the use of proprietary models, makes the evaluation of risks difficult.

# Executive Summary: Ten Key Conclusions from the Survey

## 9. Investors have strong requirements for equity factors, including both a risk-based economic rationale and extensive empirical evidence.

For the second year, investors were asked about their appreciation of the different factors inherent in equity strategies and how these factors were explaining the performance of these strategies. The factors proposed were those for which the existence of a premium had long been documented in the literature or for which products are commonly used. It may be useful to recall the key idea behind some of these factors. For example, the value and size factors capture the tendency of stocks with high book-to-market ratios or small capitalisation to display higher returns than the market average. The low volatility and momentum factors capture the effect that stocks with low price fluctuations or high past returns over an intermediate time frame tend to outperform. The profitability factor tilts towards stocks with high profits relative to capital employed, e.g. return on assets or return on equity. The investment factor describes the empirical regularity that low investment firms, i.e. firms which grow their total assets conservatively rather than expand aggressively, tend to outperform the market average.

It appears from the results that none of the eight factors proposed to respondents obtained a poor score (see Exhibit 13). On a scale from 0 (no confidence that the factor will be rewarded) to 5 (high confidence that the factor will be rewarded), the average scores, before accounting for transaction costs and other implementation hurdles, range from 2.90 (investment factor) to 3.31 (value factor). While the value factor is considered by respondents as the most likely to be rewarded, low volatility, small cap, dividend yield, profitability and

momentum also obtain quite comparable high scores.

If we exclude the investment factor, we also note that only a very little share of respondents declare being unfamiliar with the factors proposed, as their percentage is lower or equal to 5% for all of them – the dividend yield and small cap factors being the ones respondents are most familiar with and the liquidity and profitability factors the ones respondents are least familiar with. These percentages of unfamiliarity are also slightly lower than the percentages obtained last year, which shows that the knowledge of these risk factors is still improving. The investment factor was added to the list of factors for the first time this year. With about one-fifth of respondents declaring themselves to be unfamiliar with it, the investment factor is somewhat adrift of the other factors. Unsurprisingly, it is also the one which obtains the lowest rate of confidence of it being rewarded. However, after accounting for transaction costs and other implementation hurdles, the confidence level that this factor will be rewarded becomes slightly higher than those of the momentum and liquidity factors. In addition, the investment factor is also the one for which we obtain the lowest response rate in terms of the confidence level, with only 55% of respondents providing answers, compared with about 80% of respondents giving their opinion for all the other factors. This is coherent with a higher number of respondents being unfamiliar with the investment factor, compared to other factors.

Looking at the difference between the level of confidence that the factor will be rewarded and the same metric after accounting for transaction costs and other implementation hurdles (see the third column of Exhibit 13), may shed some

## Executive Summary: Ten Key Conclusions from the Survey

light on how investors perceive the ease of implementation and the costs of the strategies based on the various factors. The highest difference between the two scores is observed for the momentum and liquidity factors (0.47 and 0.46, respectively).

The momentum strategy has been documented in the literature as being subject to data-mining, high turnover, causing trading costs that limit the profitability of the strategy, as well as being subject to the risk of reversion effect, which may be difficult to predict and manage (see Bender et al., 2013). In addition, the literature suggests that the short side of the strategy is more profitable than the long side (Hong, Lim, and Stein, 2000), rendering this strategy less suitable for long-only investors. Concerning the liquidity factor, the least liquid stocks are those that provide the highest premium, but also the ones it is more difficult to invest in, which can make the strategy less easy to implement.

However, respondents have some requirements to consider the selection of a given set of factors in their investment approach (see Exhibit 14). Respondents

are first of all concerned by the existence of a rational risk premium with a score of 3.73, closely followed by the existence of extensive empirical literature documenting these premia, as well as by ease of implementation and low turnover and transaction costs, both with a score of 3.63. The least important requirement for them is for factors to be related to macroeconomic variables, with a score of 2.68. Indeed, all requirements received quite high scores.

From the results it appears that the existence of a rational explanation for factor risk premia is of main importance for investors. This is probably related to the fact that a rational explanation suggests that the premium will be persistent. Indeed, if the literature interprets the factor premia as compensation for risk, its existence could also be explained by investors making systematic errors due to behavioural "biases" such as over- or under-reactions to news on a stock. However, whether such behavioural biases can persistently affect asset prices in the presence of some smart investors who do not suffer from these biases is a point of contention. In fact, even if the average investor makes systematic errors due to behavioural

*Exhibit 13: Rewarded factors*

*Which equity risk factors do you think will be rewarded positively over the next ten years, after accounting for transaction costs and other implementation hurdles? The level of confidence was rated from 0 (no confidence) to 5 (high confidence).*

Factors	Confidence level that factor will be rewarded	Confidence level that factor will be rewarded after accounting for transaction costs and other implementation hurdles	Spread between the two levels of confidence	Not familiar with this factor
Value	3.31	3.00	0.31	3.33%
Low Volatility	3.24	2.83	0.41	3.89%
Small Cap	3.19	2.93	0.26	2.78%
Dividend Yield	3.17	2.92	0.26	2.22%
Profitability	3.13	2.86	0.28	5.00%
Momentum	3.13	2.66	0.47	3.33%
Liquidity	3.01	2.54	0.46	5.00%
Investment	2.90	2.71	0.19	19.44%

# Executive Summary: Ten Key Conclusions from the Survey

biases, it could still be possible that some rational investors who are not subject to such biases exploit any small opportunity resulting from the irrationality of the average investor. The trading activity of such smart investors may then make the return opportunities disappear. Therefore, behavioural explanations of persistent factor premia often introduce so-called "limits to arbitrage", which prevent smart investors from fully exploiting the opportunities arising from the irrational behaviour of other investors. The most commonly mentioned limits to arbitrage are short-sale constraints and funding-liquidity constraints. The main economic explanations for the value, momentum, low volatility and small cap factors are detailed in Amenc et al. (2014), and those of high profitability and investment feature in Amenc et al. (2015).

## 10. There is an important gap between investors' information requirements for smart beta and accessibility of information from providers

From our results it appears that investors are demanding exhaustive information about smart beta products. We can see that all items proposed received a high score in terms of importance. On a scale from 0 to 5, the lowest score observed is around 3,

and a large share of propositions receive a score of around 4 (see Exhibit 15). At the top of the list of information considered to be crucial by investors, we find all information concerning construction, composition, strategy, and exposure to factors of smart beta products, while at the bottom of the list is information regarding historical performance.

At the same time, respondents were asked whether they considered this information easily available. It is thus interesting to see the spread between the importance of and the accessibility to this information. It appears that the highest spread is observed for information respondents considered as crucial. For example, information about transparency on portfolio holdings over a back-test period and data mining risk are two crucial pieces of information for respondents, with a score of 4.03 and 3.81, respectively. It is also the information that appears to be the most difficult to obtain for respondents, with a score of 2.16 and 2.07, respectively. Even relatively basic information such as the index construction methodology is not judged to be easily available (score of 3.07) relative to its importance (score of 4.28). On the contrary, information about recent performance and risk over the past ten years is among the least important for respondents with a score of 3.35, but it is also the most easily

*Exhibit 14: Requirements about factors*

*Which requirements do you have in order to consider a given set of factors in your investment approach from 0 (not important) to 5 (absolutely crucial)?*

Requirements	Score
Factor premium should be related to a rational risk premium, i.e. explained by a substantial risk that the factor pays off badly in bad times	3.73
Factor premium should be documented in extensive empirical literature	3.63
Factors should be easy to implement with low turnover and transaction costs	3.63
Factors should be related to firm fundamentals	3.03
Factor premium has been explained as an "anomaly" allowing rational agents to profit from irrationality of others	3.02
Factors should be related to macroeconomic variables	2.68

# Executive Summary: Ten Key Conclusions from the Survey

Exhibit 15: Information about beta products

What information do you consider important for assessing smart beta products on a scale from 0 (not important) to 5 (crucial) and what information do you consider to be easily available on a scale from 0 (difficult to obtain) to 5 (easy to obtain).

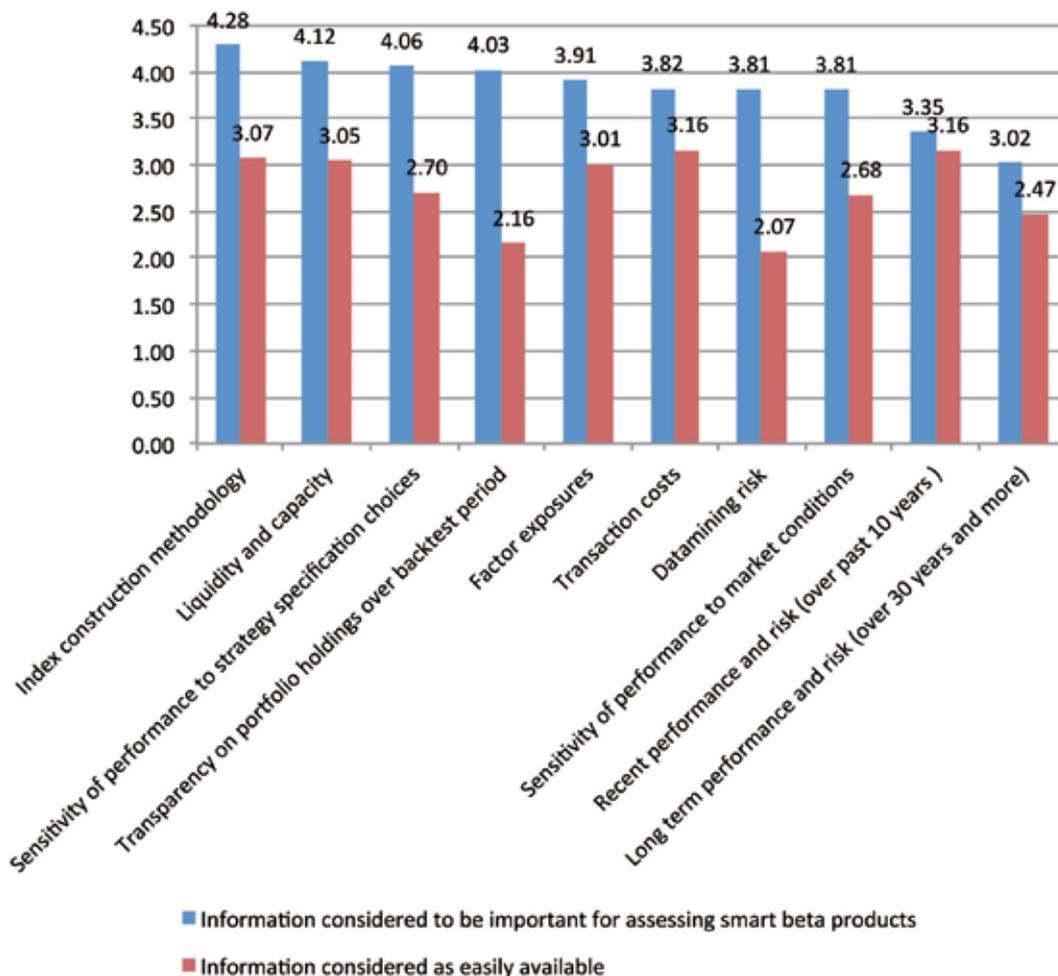
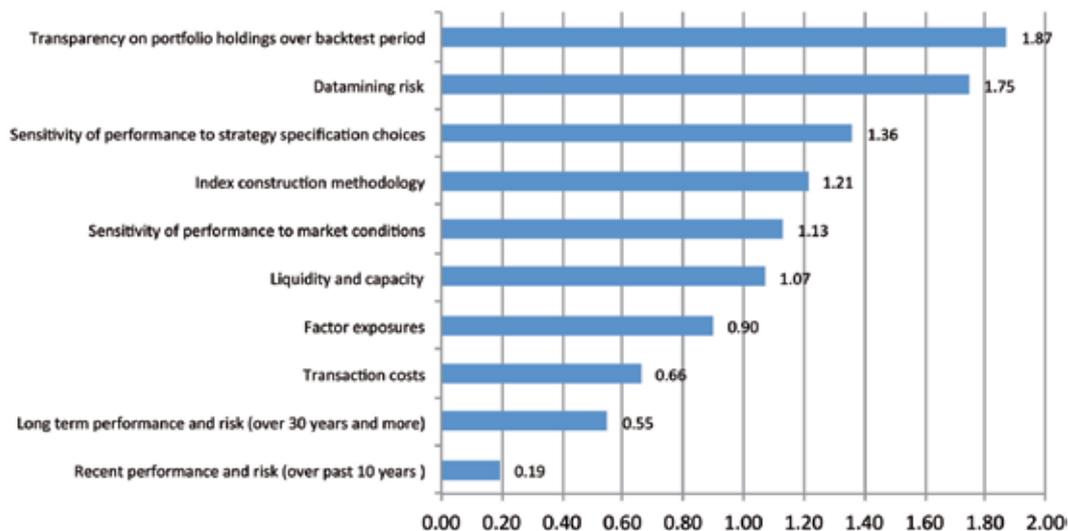


Exhibit 16: Gap between information importance and its accessibility according to investors



## Executive Summary: Ten Key Conclusions from the Survey

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available, exhibiting the highest score (3.16) across the board in terms of availability. The gap between information importance and its accessibility as seen by investors is displayed in Exhibit 16.

The fact that information that is regarded as important is not considered to be easily available clearly calls into question the information provision practices of smart beta providers. In fact, the only area in which no pronounced gap exists between the importance and the ease of accessibility scores is for performance numbers. Performance and risk information is judged to be moderately easily available and moderately important. All other areas show pronounced gaps between these two metrics. The two items that are judged to be the least easily available are holdings over the back-test period and data-mining risks. Interestingly, both these items rank much higher on the importance score for investors than, for example, past performance. Moreover, there is a pronounced gap of 1.07 between importance of information items and their ease of accessibility, as shown by the means of their respective scores (3.82 and 2.75, respectively). Overall, these results suggest that investors do not believe that information considered important for assessing smart beta strategies is made available to them with sufficient ease.

# Executive Summary: Ten Key Conclusions from the Survey

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# 1. Introduction



# 1. Introduction

Exchange-traded funds (ETFs) are perhaps one of the greatest financial innovations of recent years. Unlike conventional index funds, ETF units trade on stock exchanges at market-determined prices, thereby combining the advantages of mutual funds and common stocks. Most of them represent passive instruments designed to track the performance of a financial index as closely as possible.

Like any other exchange-traded product, the prices of ETFs are determined by the corresponding supply and demand. Thus the price may deviate below or above the net asset value (NAV). However, ETFs are characterised by a transparent and fluid share creation process which ensures that the price remains close to the NAV. In fact, if an ETF appears to be undervalued compared to its NAV, then an arbitrageur can buy the ETF units, redeem them at the custodian bank for the underlying securities and sell them on the market, thus realising a profit.<sup>3</sup>

Although the first European ETF came on the market only in 2000, assets under management (AUM) of ETFs and other exchange-traded index products amounted to \$461bn as at the end of September 2015 (ETFGI, 2015). In 15 years, ETFs have become a serious alternative to other financial products, such as futures or index funds, which allow participation in broad market movements. And the ETF market is still growing: whereas the first ETFs attempted to replicate the performance of broad equity markets, ETFs now exist for a wide range of asset classes including fixed-income, currencies and commodities, and within each asset class ETFs are venturing into covering more precise sub-segments (such as segments by yield or liquidity/size of securities) or employing innovative index construction

methodologies (such as equal-weighting, minimum volatility etc.). Another focus of innovation has been to offer more varieties of equity ETFs with similar economic exposure that provide detailed choices of how to gain this exposure, such as equity ETFs with different distributing share classes<sup>4</sup> and ETFs on currency-hedged indices. Moreover, multi-asset ETFs also come to the stage, such as ETFs replicating the portfolios containing both equities and bonds.

The development of readily-accessible index investment products may have positive effects for investors. In fact, recent research (Cremers et al., 2013) suggests that the prevalence of index replication products improves the levels of competition and efficiency of the fund management industry. At the same time, the rapid growth and innovation within the ETF market has led investors to closely examine the potential risks of ETFs. The broad aim of this survey is to analyse the current practices and perceptions among ETF users in Europe. By comparison of our results to those of our previous surveys, we aim to shed some light on trends within the ETF market.

The EDHEC European ETF Survey 2015 took the form of an online questionnaire addressed to European professionals in the asset management industry. The survey targeted institutional investors as well as asset management firms and private wealth managers. The questionnaire consists of sections covering the role played by ETFs in the survey respondents' asset allocation decisions, practical aspects of ETF investments, as well as the application of ETFs to portfolio construction. In addition, the questionnaire asks respondents to compare ETFs and other investment

3 - The indicative NAV (iNAV) is published intraday and can be compared to the price of the ETF almost in real time.

4 - For instance, Amundi ETF Euro Stoxx 50 has two distributing share classes: capitalising and dividend distributing. UBS ETF MSCI Emerging Markets TRN Index has institutional and retail share classes.

# 1. Introduction

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instruments that can be considered close substitutes: total return swaps, futures, and index funds. Finally, we invited survey respondents to express their views on the future developments in the ETF market, as well as to give their opinions about products that track smart beta indices, and on the importance of risk factors in alternative equity beta strategies, in relation to the recent considerable development in these types of indices.

This survey proceeds as follows. In the next section, we review the European ETF market and explain this financial product in more detail. The methodology used to take the survey and some information about survey respondents is described in Section 3. European investors' views of ETFs, the uses of ETFs, and comparisons of ETFs and other indexing products are presented in Section 4.

# 1. Introduction

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## 2. Background



## 2. Background

### 2.1. Overview of ETFs

ETFs are open-ended investment funds traded on a stock exchange. The first ETFs appeared in the United States in 1989 and they started trading in Europe in 2000. As at the end of September 2015 there were 4,312 ETFs worldwide managing \$2,666bn in assets (ETFGI, 2015). The assets under management (AUM) within the 1,518 exchange-traded funds constituting the European industry stood at \$461bn (ETFGI, 2015). While the large number of ETFs means that a large variety of indices are tracked – including indices on niche markets and innovative index methodologies on traditional asset universes – there is also a large choice of different ETFs that track the same or very similar indices. In Europe, at the end of November 2015, there were 15 ETFs that track the Euro Stoxx 50 index<sup>5</sup> for example. ETFs and other exchange-traded products (ETP) are still heavily oriented towards equity. Equity products account for about 69% of AUM in European ETFs and ETPs, fixed-income products account for about 24% of assets and commodity products account for about 7% with a negligible percentage of assets (0.27%) in ETFs and ETPs providing other types of exposures including multi-asset class exposures, currencies and alternative asset classes (BlackRock, 2015).

The European ETF market is mostly institutional and industry estimates in terms of the percentage of retail AUM range from 15% in continental Europe to 20% in UK, according to Vanguard (2015). The European Securities and Markets Authority (ESMA) Securities and Markets Stakeholder Group<sup>6</sup> notes that while ETFs are a “very low cost alternative” to other UCITS funds, they are “very rarely, if at all, marketed for European individual investors” due to “differences in remuneration of the distribution channels.”

In continental Europe, retail distribution has traditionally been controlled by banks, and to a lesser extent insurance companies, who have used their sales to market almost exclusively their in-house products. In 2014, 55% of the AUM in the European fund industry was controlled by third-party allocation and 45% by captive distribution channels (Giannotti and Maciver, 2015). However, the split is different from one country to another, with a dominance of captive distribution in Austria, France, Italy and Spain, while Sweden, UK and Netherlands use more third-party funds. In the United Kingdom, independent financial advisors (IFAs), dominate the retail market. These institutions and intermediaries have no direct incentive to promote ETFs, which by nature do not pay them commissions, unlike comparable unlisted vehicles, UCITS (Undertakings for Collective Investment in Transferable Securities) included.

Indeed, the management fees charged by ETFs show that they come at low cost to investors. According to Deutsche Bank (2015), the asset weighted average total expense ratio (TER) of European ETFs that offer exposure to a standard stock market index was 32 basis points, while the asset weighted TER of European ETFs that offer exposure to standard fixed-income indices was 24 basis points and the TER for commodity index ETFs was 42 basis points. It should be noted that in spite of low average TERs, considerable differences exist across ETFs. On the one hand, TERs differ depending on the indices that are tracked and are often higher for less standard indices. For example, Europe’s largest ETF provider reports a TER of 18 basis points for an ETF on US large-cap stocks while it reports a TER of 72 basis points for an ETF on Emerging Markets small-cap stocks. Moreover, pronounced differences

5 - <https://www.justetf.com/en/how-to/euro-stoxx-50-etfs.html>.

6 - ESMA Policy Orientations on Guidelines for UCITS exchange-traded funds and structured UCITS (2011).

## 2. Background

exist across providers sometimes even for ETFs that track very similar indices. For example, TERs for European ETFs from different providers tracking similar US large-cap indices range from 4 basis points to 40 basis points.

Despite strong growth since it came into existence, the ETF industry still only represents a fraction of the fund management industry: for the period from January 2009 to September 2015 the trading volume in ETFs on European exchanges amounted to 7.6% of the trading volume in cash equities and it never exceeded 10% of the trading volume in cash equities in any given month over this period (Deutsche Bank, 2015). At the beginning of 2015, the AUM in the European ETF industry represented 3.3% of those of the overall fund management industry in Europe.<sup>7</sup> A notable feature of the ETP industry is that it is highly concentrated: while 238 providers vie for the global market in September 2015, the top three players control over 69% of the AUM and the top ten players over 84% of the AUM (see BlackRock, 2015). In Europe, there were 44 providers present in September 2015 and there is slightly less concentration at the very top, with the top three players controlling 68.5% of the AUM. The dynamics of the industry have remained fairly constant since last year in terms of the number of players.

### 2.2. Understanding ETFs

As ETFs combine the diversification of index funds and the trading ease and flexibility of stocks listed on exchanges, they should be analysed from both standpoints. Like traditional index funds, ETFs usually attempt to track or replicate a particular index of equities, debts or other securities. Like mutual funds, ETFs are registered as open-ended funds, continuously offering

new fund shares to the public and required to buy back outstanding shares on request and at a price close to their NAV. Shares in ETFs can be traded on the market throughout the trading day, using the whole gamut of order types. Although the designs of ETFs and mutual funds are similar, investors can treat ETFs as normal stocks, buying or selling ETF shares through a broker or in a brokerage account, just as they would buy the shares of any publicly traded company.<sup>8</sup> ETFs give investors access to a wide array of asset classes and investment strategies. Hence they are a type of investment vehicle and not an asset class in themselves.

### Full replication ETFs, sampling

#### replication ETFs and swap-based ETFs

An ETF's replication mechanism is one of its defining features. Indeed, ETFs come in three flavours: full index replication funds, sampling replication and swap-based replication. An ETF is considered a full replicating index fund (sometimes also cash-based replication) if the ETF manager holds all the constituents of the underlying index in the same proportion as the constituent securities of the index. This is straightforward but may be costly and difficult to implement, especially if the index to be replicated is broad and contains a large number of securities. This is made even more difficult if it involves multiple jurisdictions and/or time zones.<sup>9,10</sup> These costs arise from liquidity problems with index constituents, clearing and settlement problems, and management of a large basket of securities. Such costs lead to performance deviations between the tracked index and its tracker. These deviations, which create tracking error, are made larger by differences between the index provider's assumptions relating to the taxation and reinvestment of dividends and the actual conditions faced by the fund

7 - <https://etf.deutscheam.com/GBR/ENG/Download/Press%20Releases/3dcc0a99-abf8-4d8e-a750-9ae1b126a3a2/Deutsche-AWM-ETF-outlook-2015.pdf>

8 - Sometimes ETFs are wrongly classified as closed-end funds, since both exhibit similar features, such as holding multiple securities and asset classes. Furthermore, both can be traded on exchange. The most important difference from closed-end funds is that ETFs always trade very closely to their NAV, since any deviation can be exploited by arbitrageurs' redeeming and then buying new units. Closed-end funds, by contrast, rarely trade at their NAV.

9 - In some instances (e.g. some emerging markets) access issues will make the full replication approach impossible.

10 - In some jurisdictions (e.g. the United States) diversification requirements imposed on funds will make it impossible for a fund to hold the index constituents in the proportion of the index.

## 2. Background

in terms of taxation and treasury and cash management.<sup>11</sup>

To reduce both the expenses passed on to the investor and the tracking error, an index fund may engage in ancillary performance-enhancing activities. Securities lending is one such activity that is prevalent in ETFs that are replicated physically; a full replication ETF practising securities lending holds a portfolio that no longer corresponds to the index. While generating fees and possibly also minimising dividend-related withholding tax liabilities, securities lending involves assuming counterparty risk. Hence securities lending fees can be viewed as compensation earned in exchange for assuming counterparty risk.

To reduce costs, ETFs can also use statistical sampling strategies (also known as “representative sampling”) to replicate the chosen index. Instead of fully replicating the index, the fund invests in only a fraction of the total index constituents. The aim is to replicate the index by focusing on highly liquid underlying instruments. This form is generally used for very broad indices, where it is less costly than full replication. But there is also the trade-off that it necessarily leads to tracking error, the magnitude of which depends on the accuracy of the sampling replication model. In addition, sampling replication could also engage in securities lending, which may lead to counterparty credit risk.

Rather than attempting to replicate the underlying index by holding (some or all of) its constituents, a synthetic ETF (often called a “swap-based ETF”) enters into a swap agreement with a third-party that agrees to deliver the index returns to the ETF in exchange for the returns on a portfolio which is either held by the ETF (unfunded swap structure) or held in

its name as collateral plus a fee (funded swap structure). The ETF holds (a claim to) a portfolio of ‘physical’ securities that are different from the index constituents and the swap counterparty delivers the return difference between the physical portfolio and the index tracked by the ETF.

An ETF usually has a single swap counterparty – often the parent bank of the fund provider. Some providers, however, use multiple counterparties for the swaps held by their ETFs. Through this arrangement, ETF providers transfer the tracking error risk to the swap counterparty. However, counterparty credit risk arises in the form of the risk that the counterparty may fail to deliver the promised return differential. For European ETFs, which are generally UCITS funds, this counterparty risk is limited to 10% of the fund’s value, or even 5% if the counterparty is not a credit institution, and before reaching this limit the swap position will be reset. To manage counterparty risk rigorously, exposure to this risk is assessed and monitored by the fund providers on a daily basis (Amery, 2008b). As a result of the 2008 credit crunch, the fund providers usually set a lower limit than the UCITS requirement (Amery, 2008b; Cheng, 2009).

At the same time, fund providers are also seeking other means of shedding counterparty risk. Over-collateralisation – a commonly used form for hedging credit risk – has been made part of the replication process of some swap-based ETFs. In over-collateralisation the collateral assets will have a higher value than the NAV of the ETF. In the event of counterparty default, the collateral will thus provide investors with a comfortable margin of protection. Some ETFs also cover counterparty risk by buying credit protection in the form of credit default swaps (CDS).

11 - Typically, the index will assume that dividends are paid and reinvested as soon as the stock goes ex-dividend. However, the average time between the ex-dividend date and the payment date is typically in weeks and sometimes in months.

## 2. Background

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At the end of September 2015, more than one-third of European ETF AUM (36%) was represented by synthetic replication ETFs and less than two-thirds of AUM (64%) is invested in physical replication ETFs (see Deutsche Bank, 2015).

### Dividend distribution

Like conventional index funds, ETFs can deal with dividend payments in two ways. They may, for example, pay dividends to their shareholders. Dividend payments on the securities held in the fund remain in the fund in the form of cash until they are paid out at fixed time intervals. This leaves investors with the task of managing the reinvestment of these dividends, but also allows them to obtain periodic cash flows. In between the fund's dividend payment dates, the accumulation of cash in the fund due to stock dividends may lead to small deviations of performance from the index. ETFs may also reinvest dividends. These ETFs track the total return (including reinvested dividends) on the underlying index. The only cash flows the investor has to deal with are those occurring when the ETF is traded; for the investor, the management of dividends is thus simplified.

### Primary and secondary markets

Although ETFs are registered as open-end funds, there are significant structural differences between ETFs and traditional mutual funds both in how their shares are issued and redeemed and in how their shares or units are traded. Exhibits 2.1 and 2.2 explain the operational structure and activities along the ETF transaction chain in the primary and secondary markets.

An ETF, as a registered fund company, is supported by a custodian holding its assets, an administrator producing daily NAV, and a management company looking after operations. The fund is created when

authorised market participants such as institutional investors commit capital to seed a fund that will attempt to replicate an index. Unlike traditional mutual funds or unit investment trusts, shares in the ETF are created by the authorised market participant's depositing a specified block of securities with the ETF. The authorised market participant purchases the block of the underlying securities directly on the markets, based on the information contained in the portfolio composition file (PCF), a file prepared by the ETF manager. In return for this deposit, the authorised market participant receives a fixed amount of ETF shares with NAV amounting to the value of the replicated index. ETF shares are usually created or redeemed in lots of 50,000 or 100,000 or some other pre-specified size, known as creation units. Some or all of the ETF shares may then be sold on-exchange.

On the exchange, ETF market makers look at inventories and start quoting bid and ask prices for the ETF shares. Investors can buy ETF shares through their intermediary at the quoted "ask" price or sell shares at the quoted "bid" price. Intraday buy or sell prices depend on supply and demand and on the prices of the underlying securities. If the price of the ETF shares fluctuates and deviates from its NAV, market participants can step in and make an arbitrage profit on the differences. An indicative NAV (iNAV) is published every 15 seconds for ETFs, so the price can be compared almost continuously to this iNAV. If ETFs are undervalued compared to their NAV, arbitrageurs buy ETF units and redeem them at the custodial bank in exchange for the underlying securities. If ETFs are overvalued, they buy the underlying securities, redeem them for creation units and then sell the created ETF shares on the markets. As a result, any mispricing of the NAV of the fund

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Exhibit 2.1: Overview of primary and secondary markets

The graph lays out the process of creating and redeeming an ETF in the primary market and trading it in the secondary market, indicating participants involved in this transaction flow.

### Primary market (creation)

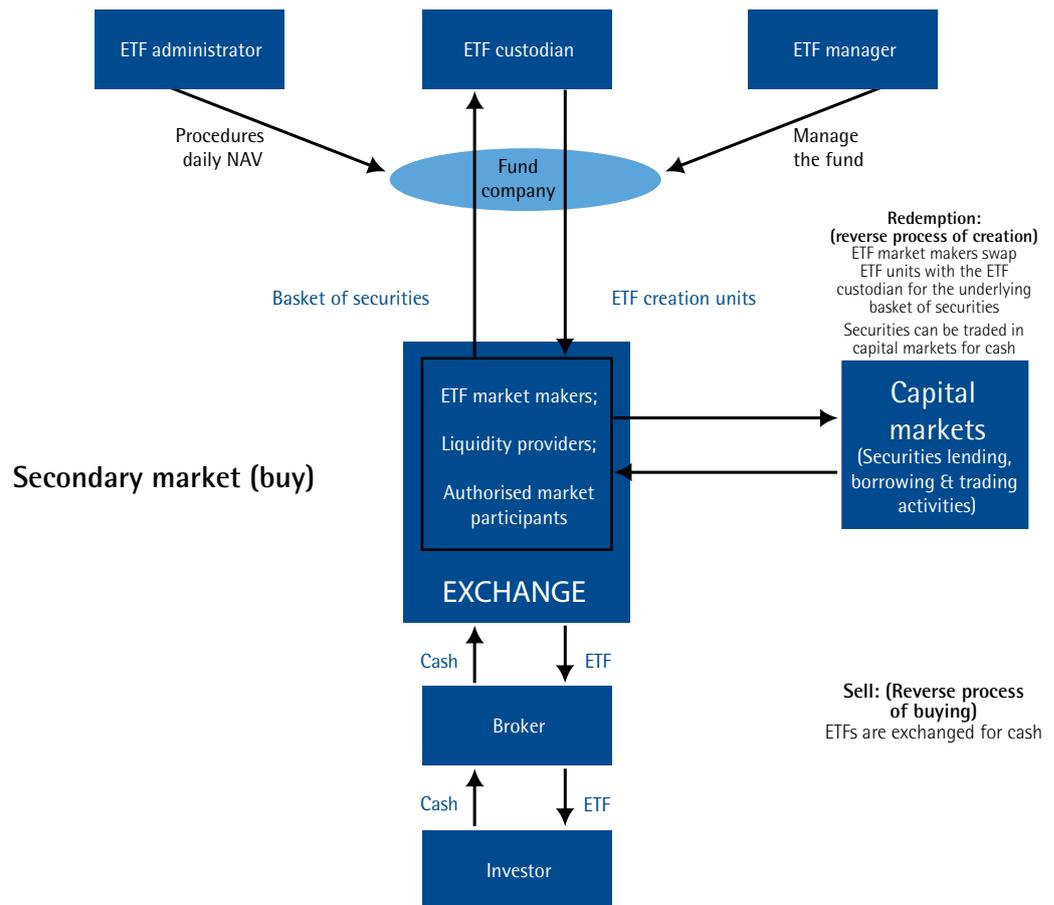


Exhibit 2.2: Typical activities during an ETF transaction in primary and secondary markets

- 1 Liquidity providers and authorised market participants commit capital to seed a fund aiming at replicating an index.
- 2 Liquidity providers and authorised market participants purchase a basket of the underlying securities, based on the portfolio composition file (PCF) prepared by the fund company.
- 3 The market makers then exchange the basket of the underlying securities with the fund company (ETF custodian) for a set number of ETF units with an NAV, that is, the value of the replicating index.
- 4 On the exchange, ETF market makers start market making and quote bid and ask prices of the ETF units based on their inventory.
- 5 Investors can buy ETF units through their retail brokers at the quoted "ask" price, in exchange for cash.
- 6 Due to continuous intraday trading, the price of the ETF may fluctuate and deviate from its NAV. Moreover, the underlying index value may also go up or down during the trading day. These events create arbitrage opportunities for the market makers.
- 7 ETF units are created or redeemed on a daily basis, which enables the market makers to keep ETF prices close to the NAV.
- 8 The market makers can swap a set number of ETF units with the ETF custodian for the underlying basket of securities, which can then be sold for cash in the secondary market.

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and the underlying security will be short-lived, and the price of the ETF is unlikely to deviate from the value of the underlying portfolio (see Mussavian and Hirsch, 2002 or Kalaycioglu, 2004).

### *Trading ETFs off exchange*

ETFs are frequently traded off exchange, especially for very large orders. The first possibility is to engage in OTC trading of ETF shares. These so-called block trades may allow investors to benefit from tighter bid/ask spreads than they would on the exchange. The second possibility is to buy an ETF at unknown NAV. An order at unknown NAV that is emitted during the day will be executed at the closing NAV of the fund. These orders lead to a creation (buy order) or redemption (sell order) of ETF units, similar to what happens in a traditional mutual fund that is not traded on-exchange. This means of buying an ETF does not lead to any bid/ask spread since the order is executed at the NAV; the investor does bear creation and redemption costs.

### **2.3. ETFs for Different Asset Classes**

In this description, we will mention only ETFs that allow access to the normal returns of an asset class or segment of assets. When we say "normal returns" we mean those that represent the reward for exposure to systemic risk factors. We do not mention ETFs that are actively managed or use structured forms of investment strategies – for instance, those offering exposure to specific payoff profiles through the use of derivatives, such as buy-write ETFs.<sup>12</sup> We describe the asset classes now covered by ETFs. In addition to the standard equity and fixed-income ETFs, we mention ETFs on a range of alternative asset classes.

#### **Equity ETFs**

ETFs that replicate stock market indices were the first on the market and are still

the most important type.<sup>13</sup> Broad market ETFs attempt to replicate the returns of the entire stock market as reflected by a broad index such as the S&P 500 for the US or the Stoxx 600 for Europe. Such broad ETFs offer diversified exposure to general equity markets. They are thus a shortcut for investors seeking to hold a part of the market (Stock, 2006).

The aim of style ETFs is to replicate the returns on a particular investment style. In equity markets, firm size (large cap, small-cap) and investment style (growth, value) have been shown by Fama and French (1992) to be important determinants for the cross-sectional variation in expected stock returns. Style ETFs build on these findings and replicate the returns of such investment strategies. Sector ETFs focus on industry sectors, which they attempt to replicate. The motivation for relying on sector exposure to construct an equity portfolio is provided in a study by Ibbotson Associates (2002) that highlights the low correlation of different sectors and the low correlation of sectors and the market. Another study (Hamelink, Harasty and Hillion, 2001) shows that the benefits of sector diversification outweigh those of country diversification. Further evidence of the importance of sector and style diversification is provided by Vardharaj and Fabozzi (2007). Finally, ETF providers have moved from providing exposure to mature markets to providing exposure to emerging market equity, either in the form of global emerging market indices or in the form of specific country exposures.

#### **Fixed-income ETFs**

In addition to equity markets, ETFs may provide exposure to fixed-income markets. These ETFs can, of course, provide exposure to broad market indices as well as to more specific segments.

12 - <http://finance.yahoo.com/news/buywrite-etf-hits-market-130014274.html>

13 - Actively managed ETFs are meant, like mutual funds, to deliver above-average returns. They charge more than traditional ETFs but, in general, less than mutual funds. They are supposed to have some of the advantages of ETFs, such as transparency, tax efficiency, and liquidity, all while being actively managed. However, since managers are paid for their stock selection, frequent disclosure of the underlying stock holdings would encourage investors to buy the underlying securities on their own instead of trading ETFs. On the other hand, if transparency is low, the price of ETFs would suffer significant deviation from the NAV of the underlying holdings.

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Maturity-segment ETFs reflect the returns on investments in debt with terms to maturity ranging from short to long. Inflation-protected bond ETFs invest only in inflation-protected bonds.

Due to the recent sovereign debt crisis, the choice of countries included in government bond indices has been the subject of some discussion. Drenovak, Urošević and Jelic (2010) have shown that differences in countries included have resulted in pronounced differences in performance. Some providers dissected the universe into high rated issuers and low rated issuers so that they could offer investors a clear picture. Also, one could see that emerging market sovereign bonds seem to be perceived more favourably compared to developed market bonds since investors consider the often lower debt-to-GDP ratio in emerging markets compared to developed countries (Yousuf, 2011; McCall, 2011). Following this trend, many ETF providers have started to launch local currency emerging market bond ETFs.<sup>14</sup>

ETFs not only track government bond indices but also broad corporate bond indices. In addition, a few sub-segment corporate bond ETFs are available to investors, for instance, financials vs. ex-financials, investment grade vs. high-yield, and short-term vs. all maturities.

CDS ETFs are another way to access to the corporate credit market other than corporate bond ETFs. CDS ETFs represent the performance for continuously investing in CDS as a protection seller/buyer. Unlike corporate bond ETFs, CDS ETFs are less sensitive to interest rate changes as the interest rates embedded are the overnight rates which lead to a close to zero duration (Deutsche Bank, 2010).

### Money market ETFs

There are also ETFs designed to replicate the returns of short-term cash instruments. These funds offer investors a way to invest in various cash-like short-term securities, including commercial paper, repurchase agreements, Treasury bills, and certificates of deposit. These funds have drawn investor attention for the interest rates they pay, usually higher than those of certificates of deposit, and for their TERs, lower than those of money market mutual funds (Johnson, 2010).

Moreover, money market ETFs usually provide a degree of diversification not easily achieved by individual investors and are seen as safer than bank deposits (Amery, 2008a).

### Currency ETFs

Currency ETFs invest in a single currency or basket of currencies. There are two main investment strategies for currency ETFs. In the first, passive tracking, movements in a particular currency or a basket of currencies are replicated. In the second, systematic currency trading, long/short positions in various currencies are taken. Examples of currency trading strategies are the carry trade and the momentum strategy. The carry trade consists simply of borrowing the low-yield currency and buying the high-yield currency. The academic literature has identified the carry trade as a source of a risk premium similar to the risk premia for value or small-cap stocks.<sup>15</sup>

The momentum strategy reflects the view that currencies will continue performing as they have been. Taking long positions in the currencies with the highest returns, short positions in the currencies with the lowest returns, or both positions, will lead to returns higher than those of a buy-and-hold strategy. Currency ETFs have attracted investors as they can be used

14 - Amundi ETF has its Global Bond Emerging Market iBoxx in 2010. iShares launched local currency emerging market debt ETFs in June 2011. There are also Market Vectors Emerging Market Local Currency Bond ETF and WisdomTree Emerging Market Local Debt ETFs listed in the US.  
15 - See Brunnermeier et al. (2008) or Jurek (2007) for an analysis of these strategies.

## 2. Background

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for hedging or diversification (Jagerson, 2007).

### Volatility ETFs

Volatility ETFs are products which intend to mimic the performance of a volatility index through rolling the index future/forward contracts. The volatility index was first introduced to the equity markets in 1993 (Whaley, 2008), and has since become a hotspot among investors. A key point to note is that volatility of equity returns tends to move in opposite directions (i.e. they are strongly negatively correlated). Hence, taking a long position on volatility could diversify equity risk (Hill and Rattray, 2004; Szado, 2009). In addition, negative correlation and high volatility are particularly pronounced in stock market downturns, offering protection against stock market losses when it is needed the most and when other forms of diversification are not very effective (Jacob and Rasiel, 2009).

Unlike volatility-linked ETNs – which are unsecured, unsubordinated debt securities – volatility ETFs are funds. In Europe, they follow UCITS regulation. Hence, there is less credit risk exposure.

### Alternative asset class ETFs

The concept of ETFs has been extended to alternative investments. These investment products enable investors to gain simple access to alternative investment opportunities such as hedge funds, commodities, real estate or infrastructure. ETFs on alternative asset classes allow investors to diversify portfolios but do not require the infrastructure needed for direct investments and manager selection in alternative asset classes, infrastructure they may be unfamiliar with. The benefits of using alternative index ETFs in a global portfolio have been analysed by Pezier (2008).

ETFs in the alternative investment universe must deal with illiquid underlying assets, an obligation at odds with one of the main objectives of ETFs, that is, to provide high liquidity. As a result, ETFs must usually rely on liquid proxies of the asset class that can only approximate the price movements in these asset classes.

Hedge fund ETFs, for example, can rely on hedge fund factor models that make it possible to replicate the performance of broad hedge fund indices by investing in more standard and thus more liquid assets. Hedge fund ETFs can also be set up with the help of managed account platforms: these ETFs enable investors to invest directly in hedge funds via so-called parallel managed accounts of hedge fund managers. To ensure the liquidity of the ETFs, only hedge fund managers who are active in strategies known for their liquidity are selected. Commodity ETFs are based mostly on commodity futures, although some funds also invest directly in such precious metals as gold. Illiquid underlying holdings are also a problem for real estate ETFs. Real estate ETFs usually replicate real estate indices that are based on real estate investment trusts (REITs), listed collective equity investment vehicles that provide relatively high liquidity. They may also invest in a basket of real estate stocks. Infrastructure ETFs invest in stocks or indices from three clusters: energy, transportation, and utilities (see Fuhr and Kelly, 2009).

### 2.4. Smart Beta ETFs

Recently, the standard practice of using a capitalisation-weighting scheme for the construction of indices has been the target of harsh criticism. Nowadays, growing demand for indices as investment vehicles has led to innovations including new weighting schemes and alternative

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definitions of sub-segments. There are many recent initiatives for non-cap-weighted ETFs as well. Since the first fundamental factor weighted ETF launched in May 2000 (Fuhr and Kelly, 2011), there have been quite a number of ETFs introduced to track non-market-cap-weighted indices,<sup>16</sup> including equal-weighted ETFs, minimum variance ETFs, characteristics-weighted ETFs, etc.<sup>17</sup> These have been coined "Smart Beta ETFs" as they seek to generate superior

risk-adjusted returns compared to standard market-capitalisation-based indices. According to Invesco PowerShares (2015), smart beta ETFs accounted for over 17% of US ETFs net inflows in 2014, despite representing less than 11% of the total assets. In addition, one-third of institutional decision-makers using ETFs are now using smart beta ETFs, compared to 24% the year before.

### Does Smart Beta Work Well Only in Back-tests? A Discussion of Robustness Issues

There has been significant evidence that systematic equity investment strategies (so-called *smart beta* strategies) outperform cap-weighted benchmarks over the long run. These strategies are usually marketed on the basis of outperformance. However, it is important to recognise that performance analysis is typically conducted on back-tests that apply the smart beta methodology to historical stock returns. Therefore, when it comes to actual investment decisions, it is pertinent to question how robust the outperformance is.

In general, robustness refers to the capacity of a system to perform effectively in a constantly changing environment. In the context of smart beta strategies, two kinds of robustness need to be taken into account – **relative robustness** and **absolute robustness**. A strategy is assumed to be 'relatively robust' if it is able to deliver similar outperformance in similar market conditions. Single factor indices aim to achieve this kind of robustness. Absolute robustness is the capacity of the strategy to deliver risk-adjusted performance in the future to a degree that is comparable to that of the past, owing to a well-understood economic mechanism rather than just by chance. Absolute robustness, in other words, is the absence of pronounced state and/or time dependencies and a strategy shown to outperform irrespective of prevailing market conditions can be termed robust in absolute terms.

#### *Potential causes of lack of robustness*

Lack of robustness in smart beta strategies can be caused mainly by exposure to three different risks in the strategy construction process – factor fishing and model mining, specific risks, and strong factor dependencies. While the first two issues can have a major influence on relative robustness, the last point is at the heart of the issue of absolute robustness.

#### *Factor fishing and model mining risks as causes for lack of relative robustness*

Investors who wish to benefit from factor premia need to address robustness when selecting a set of factors. Harvey, Liu and Zhu (2013) document a total of 314 factors with a positive historical risk premium, showing that the discovery of the premium

16 - For instance, PowerShares adopted a fundamental index methodology and launched PowerShares FTSE RAFI ETFs that cover both the US and global markets since 2005. Wisdom Tree introduced a series of ETFs weighted by different fundamental factors, such as dividends and earnings since 2006. RevenueShares launches some revenue-weighted ETFs in 2008.  
17 - Rydex introduced the first equal-weighted ETF in 2003. It tracks the S&P Equal Weight Index. iShares and Ossiam also launched equal-weighted ETFs in 2011. In May 2011, PowerShares launched the first beta and the first volatility weighted ETFs.

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could be a result of data mining i.e. strong and statistically significant factor premia may be a result of many researchers searching through the same data set to find publishable results. For example, when capturing the value premium one may use extensive fundamental data including not only valuation ratios but also information on, for example, the sales growth of the firm.

While there is an economic rationale for the value factor that is compatible with asset pricing theory, the selection of stocks by fundamental data brings us back to the argument of mispriced or undervalued stocks, which is not based on any theoretical corpus. We perceive that this argument of mispricing for growth tech stocks favours the design of a fundamentals-based strategy after the tech bubble. This kind of weighting scheme consequently gives a sector bias to the strategy and is otherwise not based on any fundamental criterion that is associated with a long-term risk premium.

Therefore, a key requirement for investors to accept factors as relevant in their investment process is that there is a clear economic intuition as to why the exposure to this factor constitutes a systematic risk (Kogan and Tian, 2015). Failure to recognise a suitable proxy for the rewarded factor will harm the relative robustness of the strategy.

Model mining risk is the risk of having an index construction methodology that results in a good track record in back-testing. Many value-tilted indices include a large set of *ad-hoc* methodological choices, thereby opening the door to data mining.

### *Exposures to specific risks as cause for lack of relative robustness*

All smart beta strategies are exposed to unrewarded strategy-specific risks. Specific risks correspond to all the risks that are unrewarded in the long run, and therefore not ultimately desired by the investor. In line with portfolio theory, among the unrewarded risks we find **specific financial risks** (also called idiosyncratic stock risks) which correspond to the risks that are specific to the company itself. It is this type of risk that asset managers are supposed to be the best at identifying, evaluating and choosing in order to create alpha, but portfolio theory considers it to be neither predictable nor rewarded, so it is better avoided by investing in a well-diversified portfolio.

Specific risks can also correspond to important **financial risk factors** that do not explain, over the long term, the value of the risk premium associated with the index. The academic literature considers for example that commodity, currency, and sector risks do not have a positive long-term premium. For example, value strategies often lead to pronounced tilts towards financial sector stocks. During the financial crisis of 2008, exposure to the financial sector proved to be a major determinant of performance of these strategies. It should be noted that the tilt towards the financial sector may not be desired, but it came as a by-product of holding value stocks.

Model-specific risks that are specific to the implementation of the diversification model are also a form of unrewarded risk. As per Modern Portfolio Theory, every investor should optimally combine risky assets so as to achieve the highest possible Sharpe ratio. Implementing this objective, however, is a complex task because of the presence of estimation risk for the required parameters, namely expected returns and

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covariance parameters. In practice, the costs of estimation error may entirely offset the benefits of optimal portfolio diversification.

### *Dependency on individual factor exposures as cause for lack of absolute robustness*

Systematic risks come from the fact that smart beta strategies can be more or less exposed to particular risk factors depending on the methodological choices guiding their construction (implicit) but also on the universe of stocks supporting this construction scheme (explicit). For example, fundamentals-weighted portfolios typically have a value tilt and minimum-volatility strategies exhibit a low-beta tilt (Scherer, 2011; Blitz and Swinkels, 2008; Amenc, Goltz and Le Sourd, 2009). Each weighting scheme exposes investors to implicit risk factors which may or may not be consistent with their risk objective. It is important to note that periods of poor performance in all factors are common throughout long-horizon historical tests, and the underperformance occurs at different points in time. Therefore, investing in a single factor is not a robust approach in absolute terms, as the performance will vary greatly over time and across different periods.

### **Improving robustness**

We propose three ways in which the robustness of various smart beta strategies can be improved.

#### *Avoidance of data or model mining through a consistent framework*

A very effective mechanism to avoid data mining is by establishing a consistent framework for smart beta index creation, thus limiting the choices while providing the flexibility needed for smart beta index creation. Consistency in the index framework has two main benefits. First, it prevents model mining by limiting the number of choices through which indices can be constructed. A uniform framework is the best safeguard against post hoc index design, or model mining (i.e. the possibility of testing a large number of smart beta strategies and publishing those that have good results).

Second, analysis across specification choices is vital because the range of outcomes gives a more informative view than a single specification, which could always have been picked. An index that performs well across multiple specification choices is more robust than an index that performs only in a single specification choice which could very well have been by chance rather than because of the robustness of the strategy. Pre-packaged indices do not allow investors to compare across specifications in order to obtain a view on the sensitivity of performance to index specification choices, thereby exposing investors to a risk of unintended consequences of undesired risks.

Another approach that addresses the inconsistency of the conceptual framework is to look at the evolution or change of methodology over time for the same strategy or the same factor. Some index providers launched new indices when they already had indices for the same factor on the market. In this case, the new indices have the same objective as the old ones, but different construction principles. This phenomenon has a striking resemblance to the fund or asset manager practice of creating new funds

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or changing strategy in order to overshadow the poor track record of older funds. Thus, the existence of an inconsistent framework over time is also a form of model mining that allows index providers to launch new indices with better track records.

### *Improving relative robustness by reducing unrewarded risks*

Relative robustness can be improved by minimising the unrewarded risk as much as possible. There are numerous approaches to estimating risk parameters. The sample estimator of a covariance matrix produces extremely high estimation errors when the ratio of universe size to sample size is large (Kan and Zhou, 2007) – sample risk. One solution to this problem is to reduce the number of parameters to be estimated by imposing a structure on the covariance matrix (Chan, Karceski and Lakonishok, 1999). Although this method reduces sample risk, its drawback is that the estimator is biased if the risk model does not conform to the true stock-return-generating process – model risk. The next generation of estimators aims to achieve a trade-off between sample risk and model risk by combining sample estimators and structured estimators (Ledoit and Wolf, 2003). Another way to reduce model risk, and not necessarily at the cost of sample risk, is to use an implicit factor model such as principal component analysis (PCA), especially when implementing PCA while limiting the number of statistical factors using Random Matrix Theory in order to achieve parsimony and robustness (Plerou et al., 2002).

One serious concern with optimisation-based weighting schemes is that the stocks with the highest estimation error may receive the highest weight – a process commonly known as “Error Maximisation” – which is detrimental to the relative robustness of the strategies. In practice, various kinds of deconcentration constraints are adopted to improve diversification. Jagannathan and Ma (2003) provided empirical evidence that imposing non-negativity constraints removes large outliers and hence provides better performance through better diversification. Deconcentration constraints ensure sufficiently balanced weights across constituents. DeMiguel et al. (2009) introduce flexible quadratic constraints that put limits on the overall amount of concentration in the portfolio (e.g. on the sum of squares of portfolio weights) rather than limiting the weight of each stock in the portfolio, thus leaving more room for the optimiser while avoiding concentration overall.

Even though different weighting schemes offer efficient diversification of stocks, there is a need for additional diversification of the weighting schemes to diversify away the strategy-specific risks – a concept known as “Diversifying the Diversifiers”.<sup>18</sup> The combination of different strategies diversifies risks that are specific to each strategy by exploiting the imperfect correlation between the different strategies’ parameter estimation errors. Thus, diversifying the model risks further reduces the unrewarded risks and renders the weighting scheme more robust (in a relative sense).

### *Improving absolute robustness by diversifying across factors*

As discussed before, investors who rely on single factor exposure take the risk of the likelihood of the underlying factor underperforming over short periods. The reward for exposure to these factors has been shown to vary over time (see e.g. Harvey, 1989; Asness, 1992; Cohen, Polk and Vuolteenaho, 2003). While this time variation

18 - See Timmermann (2006), Kan and Zhou (2007), Tu and Zhou (2011) and Amenc et al. (2012b) on the benefits of combining portfolio strategies.

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in returns is not completely in sync for different factors, allocating across factors allows investors to diversify the sources of their outperformance and smooth their performance across market conditions.

### *Overview: how to improve robustness in smart beta performance*

To conclude the section on improvement of robustness, Exhibit 2.3 summarises how to improve robustness in smart beta performance.

*Exhibit 2.3: Best Practices to Improve Robustness*

Category	Best Practices: Requirements for Robustness	Common Practice: Risk of a Lack of Robustness
Methodology	Consistent framework	<i>Ad-hoc</i> methodologies open the door for data mining/ model mining
Factor definitions	Simple, tried and tested factors (e.g. Book-to-Price for 'Value')	Complex, proprietary and unproven factor definitions (e.g. use of proprietary variables, adjustments or constraints)
Weighting scheme	Diversification of model risk and robust risk parameter estimation	Choice of a single weighting model and high sensitivity to input parameters
Transparency	Full transparency – free access to historical constituents and weights and unambiguous ground rules	Opaque and restricted or no access to back test data with ambiguous ground rules

### ***Assessing conditional performance, outperformance probability, and live performance***

When assessing the robustness of a smart beta strategy one necessarily needs to rely on a conceptual analysis of the strategy design. Purely evaluating performance data will not prove conclusive when it comes to the degree of robustness of a strategy. For example, a strategy that has been derived from extensive data mining may certainly perform well in a long-term historical data set, if the time period and data set essentially correspond to those that had been used to design an over-fitted strategy. Even when assessing out-of-sample performance, one might not be able to detect a lack of robustness if the out-of-sample period is relatively short. In fact, over any short time period, a given strategy could generate performance benefits purely due to chance. At the end of the day, what would be needed for a conclusive assessment is long-term live performance, ideally spanning several decades, which is simply not available for any of the commercially-available smart beta indices. This does not mean, however, that we should not look at performance data to inform our evaluation of robustness. In fact, there are essentially two ways in which we can assess robustness by deviating voluntarily from the back-test time frame which may have been used to data-mine a strategy prior to launch. Firstly, we can exploit any reasonably long historical backtrack, and divide it into sub-samples reflecting certain market or factor conditions. Such an assessment specifically uncovers some of the sensitivities of performance to market factors that may be hidden in a longer term back-test average performance result. Secondly, we can assess robustness by looking at the historical probability of outperforming the cap-weighted reference index over a given investment horizon. This is an intuitive measure to show how often the strategy has managed to outperform the cap-weighted reference index in the past. It is calculated by computing the probability

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of obtaining positive excess returns if one invests in the strategy for a given time period (e.g. three years) at any point during the complete history of the strategy. Third, we can of course assess live performance, even if it is relatively short, to get an idea of a strategy's behaviour in a real investment context on a post-launch basis.

### Conditional performance

Exhibit 2.4 provides a conditional performance assessment using ten years of data.

*Exhibit 2.4: Conditional Performance (Over the Broad CW benchmark)*

*Conditional performance of the FTSE RAFI Developed 1000 index, the MSCI World Equal Weighted index, the MSCI World Minimum Volatility index, the Scientific Beta Multi-Beta Multi-Strategy (EW) index and the Scientific Beta Multi-Beta Multi-Strategy (ERC) index. The analysis is based on daily total return data in USD from 31 December 2005 to 31 December 2015 (10 years). All statistics are annualised. The benchmark is the cap-weighted portfolio of all stocks in the investable universe. Data source: Bloomberg and www.scientificbeta.com.*

Developed World 31/12//2005 - 31/12/2015	SciBeta Developed MBMS EW	SciBeta Developed MBMS ERC	FTSE RAFI Developed 1000	MSCI World Equal Weighted	MSCI World Minimum Volatility
<b>Bull Markets</b>					
Annual Relative Returns	0.01%	0.24%	2.72%	1.80%	-6.02%
Annual Tracking Error	2.12%	1.81%	4.08%	3.10%	7.12%
Information Ratio	0.00	0.13	0.67	0.58	-0.85
<b>Bear Markets</b>					
Annual Relative Returns	3.63%	3.04%	-3.35%	-2.43%	12.36%
Annual Tracking Error	3.46%	3.24%	4.89%	4.79%	8.96%
Information Ratio	1.05	0.94	-0.69	-0.51	1.38

It is clear that the multi-beta multi-strategy (MBMS) indices are much more robust to factor conditions. They tend to deliver outperformance without much dependence on individual factor returns.

The picture is different for Smart Beta 1.0 strategies, which provide implicit exposure to only one or perhaps two factors, thus leading to high sensitivity of performance to factor regimes for individual factors.

*Exhibit 2.5: Conditional Excess Returns (Over the Broad CW Benchmark)*

*Conditional excess returns of the FTSE RAFI Developed 1000 index, the MSCI World Equal Weighted index, the MSCI World Minimum Volatility index, the Scientific Beta Multi-Beta Multi-Strategy (EW) index and the Scientific Beta Multi-Beta Multi-Strategy (ERC) index. The quarters are divided into top and bottom 25 percentiles based on returns of the Market, HML, SMB and Low Volatility factors. The SMB factor is the daily return series of a cap-weighted portfolio that is long small-cap stocks and short the largest 30% of market-cap stocks in the investable universe. The HML factor is the daily return series of a cap-weighted portfolio that is long the highest 30% and short the lowest 30% of B/M ratio stocks in the investable universe. The Low Volatility factor is the daily return series of a cap-weighted portfolio that is long the lowest 30% and short the highest 30% of 104-week returns volatility stocks in the investable universe. The analysis is based on daily total return data in USD from 31 December 2005 to 31 December 2015 (10 years). All statistics are annualised. The benchmark is the cap-weighted portfolio of all stocks in the investable universe. Data source: Bloomberg and www.scientificbeta.com.*

Annual Excess Returns (over CW)	Top 25% Quarters by Market factor returns	Bottom 25% Quarters by Market factor returns
SciBeta Dev Multi-Beta Multi-Strategy (EW)	-2.15%	3.95%
SciBeta Dev Multi-Beta Multi-Strategy (ERC)	-1.25%	3.32%
FTSE RAFI Developed 1000 Index	10.97%	-3.19%
MSCI World Equal Weighted Index	6.34%	-1.92%
MSCI World Minimum Volatility Index	-13.50%	14.33%

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Annual Excess Returns (over CW)	Top 25% Quarters by SMB factor returns	Bottom 25% Quarters by SMB factor returns
SciBeta Dev Multi-Beta Multi-Strategy (EW)	2.79%	1.45%
SciBeta Dev Multi-Beta Multi-Strategy (ERC)	2.99%	0.93%
FTSE RAFI Developed 1000 Index	5.16%	-2.93%
MSCI World Equal Weighted Index	9.01%	-4.43%
MSCI World Minimum Volatility Index	-4.19%	11.36%
Annual Excess Returns (over CW)	Top 25% Quarters by HML factor returns	Bottom 25% Quarters by HML factor returns
SciBeta Dev Multi-Beta Multi-Strategy (EW)	1.25%	2.13%
SciBeta Dev Multi-Beta Multi-Strategy (ERC)	2.50%	1.20%
FTSE RAFI Developed 1000 Index	14.10%	-7.12%
MSCI World Equal Weighted Index	5.83%	-4.21%
MSCI World Minimum Volatility Index	-0.85%	9.65%
Annual Excess Returns (over CW)	Top 25% Quarters by LOW VOL factor returns	Bottom 25% Quarters by LOW VOL factor returns
SciBeta Dev Multi-Beta Multi-Strategy (EW)	5.51%	-4.05%
SciBeta Dev Multi-Beta Multi-Strategy (ERC)	4.44%	-3.12%
FTSE RAFI Developed 1000 Index	-3.34%	7.03%
MSCI World Equal Weighted Index	-1.95%	4.91%
MSCI World Minimum Volatility Index	18.95%	-16.75%

### *Probability of outperformance*

Since the performance of smart beta varies over time, the analytics reported over long horizons (for example excess returns over 10 years) have limited information because of averaging over time periods. Probability of outperformance is a measure that overcomes this limitation. The probability of outperformance is defined as the empirical frequency of outperforming the cap-weighted reference index over a given investment horizon. It is an intuitive and relevant measure which shows how often and consistently the strategy would be able to outperform the cap-weighted reference index in the past for all possible entry points. It proves useful when differentiating between two strategies with similar long-term performance, although one has small but consistent outperformance while the other benefits from a few periods of high gains combined with long runs of losses. In this example, the former strategy is more robust in an absolute sense and the performance of the latter is disrupted and accompanied by risk.

Exhibit 2.6 presents the 1-year, 3-year and 5-year probabilities of outperformance of the FTSE RAFI 1000 Developed Index, the MSCI World Equal Weighted Index, the MSCI World Minimum Volatility Index, the Scientific Beta Multi-Beta Multi-Strategy (EW) index and the Scientific Beta Multi-Beta Multi-Strategy (ERC) index for the past 10 years. We can clearly see that the SciBeta MBMS EW and ERC strategies have higher outperformance probabilities than single factor strategies and are thus more robust in delivering consistent outperformance.

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*Exhibit 2.6: Outperformance Probability (Over the Broad CW Benchmark)*

Outperformance probability of the FTSE RAFI Developed 1000 index, the MSCI World Equal Weighted index, the MSCI World Minimum Volatility index, the Scientific Beta Multi-Beta Multi-Strategy (EW) index and the Scientific Beta Multi-Beta Multi-Strategy (ERC) index. The analysis is based on daily total return data in USD from 31 December 2005 to 31 December 2015 (10 years). It is computed using a rolling window analysis with window length corresponding to the investment horizon (1/3/5 years) and a one-week step size. The benchmark is the cap-weighted portfolio of all stocks in the investable universe. Data source: Bloomberg and [www.scientificbeta.com](http://www.scientificbeta.com).

	Outperformance Probability 1Y	Outperformance Probability 3Y	Outperformance Probability 5Y
SciBeta Dev Multi-Beta Multi-Strategy (EW)	77.66%	97.27%	100.00%
SciBeta Dev Multi-Beta Multi-Strategy (ERC)	80.43%	99.73%	100.00%
FTSE RAFI Developed 1000 Index	45.74%	60.66%	47.33%
MSCI World Equal Weighted Index	48.51%	52.46%	70.61%
MSCI World Minimum Volatility Index	53.62%	80.05%	82.44%

### *As a conclusion, what about live performance?*

Many investors see smart beta is as often being sold as a substitute for an active manager, so it seems relevant to also look at the live track records of these indices. While it appears difficult to find long-duration live track records for the new generations of smart factors and multi-factors or multi-smart-factor indices, it is possible to appraise the robustness of the first generations of smart beta indices. In Exhibit 2.7, we present the live performances of four popular smart beta strategies, namely the FTSE EDHEC-Risk Efficient US index, the FTSE RAFI US index, the S&P 500 EW index and the MSCI Minimum Volatility US index.

*Exhibit 2.7: Performance Analysis – FTSE EDHEC-Risk Efficient USA Index and its Competitors*

The table shows the return and risk performance of the FTSE EDHEC-Risk Efficient USA index and its competitors: the FTSE RAFI US 1000 index, the MSCI Minimum Volatility index and the S&P 500 Equal Weight index. All statistics are annualised and daily total returns from 23 November 2009 to 31 December 2015 are used. Returns are in USD. The "Secondary Market US Treasury Bills (3M)" is the risk-free rate in US Dollars for the USA. The cap-weighted benchmark is the SciBeta USA CW index. Source: [scientificbeta.com](http://scientificbeta.com).

USA 23/11/2009 to 31/12/2015	Broad CW	FTSE EDHEC-Risk Efficient USA	FTSE RAFI US 1000	MSCI Min Vol US	S&P 500 EW
Annual Returns	12.78%	15.49%	12.91%	14.18%	14.25%
Annual Volatility	15.75%	15.77%	16.42%	12.14%	17.20%
Sharpe Ratio	0.81	0.98	0.78	1.16	0.82
Maximum Drawdown	18.58%	19.11%	21.08%	13.98%	22.71%
Annual Relative Returns	-	2.71%	0.13%	1.40%	1.47%
Tracking Error	-	2.60%	2.35%	5.32%	2.80%
Information Ratio	-	1.04	0.05	0.26	0.53
95% Tracking Error	-	3.43%	2.90%	7.71%	3.79%
Maximum Relative Drawdown	-	4.22%	5.89%	12.04%	6.94%

The considerable difference in live performance is, in our view, testimony to the attention paid by the designer of the methodology to offering robust weighting schemes over and above the simulated performance.

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### Long-Term Rewarded Equity Factors: What Can Investors Learn from Academic Research?

#### *The venerable "academic grounding"*

Equity index products that claim to provide exposure to factors which have been well documented in academic research, such as value and momentum, among others, have been proliferating in recent years. Interestingly, providers across the board put strong emphasis on the academic grounding of their factor indices.<sup>19</sup> It therefore appears useful to analyse what academic research has to say on equity factors in order to understand what we can learn from such research on designing or evaluating factor indices. When analysing academic publications on equity factor investing, three important lessons emerge, which are addressed in the sections below.

#### *Lesson One: "Be serious with data"*

When establishing which factors carry a reward by way of empirical analysis, it is important to understand that this is a rather daunting task. In fact, since the paper by Merton (1980), has become well-known that researchers struggle to estimate expected returns reliably, simply because there are very few data points that can be relied on to estimate long-term expected returns: the starting price level and the end date price level. Of course, this is also true for factor returns.

Given this difficulty, when testing whether a factor carries a positive premium, academic research conducts a thorough assessment, including the analysis of very long-term data (covering time spans of at least 40 years), analysis across different regions and asset classes, and various corrections for possible data-mining biases. Importantly, these studies are open to criticism. Numerous papers are written to question previous empirical results (see for example the debate on the "low volatility puzzle"). For these reasons, academic research is much more capable of providing meaningful conclusions than a product back-test for a given factor index product. Even if a back-test is conducted very thoroughly by a product provider, it is hard to believe that the provider is able to conduct as thorough an analysis of the whole academic community, whose members have strong incentives not only to publish their own results but also to challenge the results of others by way of replicated tests. Therefore, factors which have undergone academic "validation" constitute a much stronger empirical justification than a mere product back-test.

The first important characteristic of empirical evidence on factor premia, as mentioned above, is that this evidence is derived based on tests applied to long-term data. In fact, studies on US equity data typically span at least 40 years of data, and in many cases, data goes as far back as the 1920s. For illustrative purposes, Exhibit 2.8 provides an overview of results obtained on key factors with long-term US data.

19 - For example, consider the following quotes from marketing material of index providers: "MSCI currently identifies six equity risk premia factors.... They are grounded in academic research..."; "In developing the Russell High Efficiency Factor Index series ... we ensured that all of our factor specifications were consistent with academic research findings," "The FTSE Global Factor Index Series is... designed to represent ... factor characteristics for which there is a broad academic consensus"; ERI Scientific Beta: "factor indices are meant to be investable proxies for rewarded factors that have been analysed in the academic literature."

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Exhibit 2.8: US Evidence on Equity Factor Premia

Factor	Factor Definition	Period	Premium	t-stat	Source
Market	Excess returns of cap-weighted equity index	1926-2008	7.72% (annual)	3.47	Ang <i>et al.</i> (2009)
Low Risk	Stocks with low vs. high risk (beta, volatility or idiosyncratic volatility)	1926-2012	0.70% (monthly)	7.12	Frazzini-Pedersen (2014)
Size	Stocks with low vs. high market cap	1926-2008	2.28% (annual)	1.62	Ang <i>et al.</i> (2009)
Value	Stocks with high vs. low book-to-market	1926-2008	6.87% (annual)	3.27	Ang <i>et al.</i> (2009)
Momentum	Stocks with high vs. low returns over past 12 months (omitting last month)	1926-2008	9.34% (annual)	5.71	Ang <i>et al.</i> (2009)
Profitability	Stocks with high vs. low profitability (e.g. return on equity or gross profitability)	1963-2013	0.17% (monthly)	2.79	Fama-French (2014)
Investment	Stocks low vs. high investment (change in total assets)	1963-2013	0.22% (monthly)	3.72	Fama-French (2014)

A second important characteristic of empirical research on factor premia is the assessment across different regions and asset classes. In fact, merely deriving a result from US data, even if it holds in long-term data, does not allow the findings to be generalised to other geographic or investment contexts. From the standpoint of generalisation, it is therefore interesting if results can be confirmed on equity markets for other geographies or even in entirely different asset classes. Research has made considerable progress in this direction over the past decade, with surprisingly strong confirmation of the US equity results in other investment universes.

Exhibit 2.9: Empirical Evidence for Selected Factor Premi

	US Equities	International Equities	FCC
Value	Basu (1977); Rosenberg, Reid and Lahnstein (1985); Fama and French (1993)	Fama and French (2012)	Asness, Moskowitz and Pedersen (2013)
Momentum	Jegadeesh and Titman (1993); Carhart (1997)	Rouwenhorst (1998)	Asness, Moskowitz and Pedersen (2013)
Low Risk	Ang <i>et al.</i> (2006); Frazzini and Pedersen (2014)	Ang <i>et al.</i> (2009); Frazzini and Pedersen (2014)	Frazzini and Pedersen (2014)
Size	Banz (1981); Fama and French (1993)	Heston, Rouwenhorst and Wessels (1999); Fama and French (2012)	N.A.
Profitability	Novy-Marx (2013); Hou, Zhang and Xue (2014b); Fama and French (2014)	Ammann, Odoni and Oesch (2012)	N.A.
Investment	Cooper, Gulen and Schill (2008); Hou, Zhang and Xue (2014b); Fama and French (2014)	Watanabe <i>et al.</i> (2013)	N.A.

A third important precaution taken by empirical research before jumping to conclusions on the premium for a given factor is to adjust for data-mining or so-called "Multiple Testing". In fact, standard statistical tests are only valid when we test a given single hypothesis, such as that high book-to-market stocks carry a premium over low book-to-market stocks. However, in practice researchers may run several tests, for example trying out a large number of metrics until they find one that leads to significant results. This is also known as data-snooping or data-mining.

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To consider why such multiple testing may lead to false inference, consider a simple example. Assume you simulate data for 100 variables (potential “factors”) that have a zero mean. You would then expect to find about five variables with a mean (“premium”) significantly different from zero. This suggests that, even though the true mean (“premium”) on all of the variables (“factors”) is zero in the simulation, the statistical inference will tell you that some of the means are significantly positive, as long as you run enough tests.

In order to adjust for this problem, researchers have come up with tighter requirements for significance levels to take into account the possibilities of multiple testing. For example, Harvey, Liu and Zhu (2015) adjust t-ratios that are used for evaluating the significance of factor premia to take into account the fact that researchers have run many tests across hundreds of factors to document their premia. Interestingly, when applying these methods to standard equity risk factors, researchers find that the main factors, such as value and momentum among others, remain statistically significant.

Despite the thorough evidence supporting the existence of premia for the main factors, there is continuous debate over the set of relevant equity factors. In fact, research often debates whether a factor has disappeared or a new factor has appeared. While questioning the baseline results and discussing relevant actors is obviously useful, investors in practice should be prudent before making abrupt changes to their set of factors or the associated investment beliefs. As mentioned before, the measurement of a risk premium is highly sensitive to the chosen sample (Merton, 1980), and estimates of factor premia are subject to considerable uncertainty. Therefore, any conclusions based on empirical evidence should only be drawn from studying very long time periods, and conducting tests across different data sets. Moreover, any arguments in favour of the disappearance of standard factors or the appearance of new factors should not be investigated based on empirical evidence alone, but should also consider the underlying economic mechanisms, an issue we turn to in the next section.

### *Lesson Two: “Being serious with data is not enough”*

In addition to convincing empirical evidence, the existence of a factor premium should be supported by a compelling economic rationale. Kogan and Tian (2015) make this point prominently when they write: *“We should place less weight on the data the models are able to match, and instead closely scrutinise the theoretical plausibility and empirical evidence in favour of or against their main economic mechanisms.”*

To illustrate why the existence of an economic rationale is an important requirement for considering a factor to be rewarded, it is useful to take the equity market risk premium as an example. From an empirical perspective, the equity risk premium can be statistically indistinguishable from zero even for relatively long sample periods. However, economic reasoning suggests that stocks *should* have higher rewards than bonds. Clearly, even if the premium for holding equity is well-documented empirically, investors are reluctant to hold too much equity due to its risks. Similar reasoning can be applied to additional equity risk factors. Instead of focusing only

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on the empirical evidence, investors' due diligence should look at why there *should* be a risk premium for a given factor in the first place. In other words, investors should ask what the economic rationale for a factor premium is, to form an opinion on its existence and persistence.

The existence of factor premia can be explained in two different ways – a risk-based explanation and a behavioural-bias explanation. The risk-based explanation postulates that the risk premium is compensation to investors who are willing to take additional risk by being exposed to a particular factor. Additional risk exists when assets that correspond to a given factor tilt tend to provide poor pay-offs in bad times, thus exposing investors to a risk of losses in times when their economic situation is already poor, their consumption is low, and marginal utility of consumption is high. The behavioural explanation predicates that the factor premia exist because investors make systematic errors due to behavioural biases such as over- or under-reactions to news on a stock.

Whether such behavioural biases can persistently affect asset prices is a point of contention given the presence of smart market participants who do not suffer from these biases. For behavioural explanations to be relevant, it is necessary to assume that – in addition to biases – there are so called "limits to arbitrage", i.e. some market characteristics, such as short-sale constraints and funding-liquidity constraints, which prevent smart investors from fully exploiting the opportunities arising from the irrational behaviour of other investors.

If the risk premium can only be explained by behavioural reasoning, it is expected to disappear in the absence of limits to arbitrage. On the other hand, a risk factor with a strong rational or risk-based explanation is more likely to continue to have a premium in the future. Therefore, it is perhaps more reassuring for an investor to have a risk-based explanation.

We refer to Exhibit 2.10 for a brief list of risk-based and behavioural explanations of each factor.

*Exhibit 2.10: Economic Mechanisms Behind Main Factors*

	Risk-Based Explanation	Behavioural Explanation
Value	Costly reversibility of assets in place: high sensitivity to economic shocks in bad times	Overreaction to bad news and extrapolation of the recent past leads to under-pricing
Momentum	High-expected-growth firms are more sensitive to shocks to expected growth	Investor overconfidence and self-attribution bias leads to returns continuation in the short term
Low Risk	Liquidity-constrained investors have to sell leveraged positions in low-risk assets in bad times when liquidity constraints become binding	Disagreement of investors about high-risk stocks leads to overpricing due to short-sale constraints
Size	Low liquidity, high distress and downside risk is compensated by higher returns.	Limited investor attention to smaller cap stocks
Profitability	Firms facing high cost of capital will invest only in the most profitable projects	Investors do not discern high and low profitability in growth firms
Investment	Low investment reflects firms' limited scope for projects given high cost of capital	Investors under-price low investment firms due to expectation errors

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### *Lesson Three: "Be practical"*

A common criticism of academic research on factor premia is the supposed impracticality of academic factor definitions, simply because most results in academic research abstract from transaction costs and other implementation issues such as turnover. It is indeed the case that many academic studies do not necessarily aim to consider implementation issues. In fact, product providers often justify deviations from academic factors with implementation needs. That said, while early studies indeed abstract away from implementation issues, recent academic research addresses this shortcoming. In particular, recent research examines whether the premia to common equity risk factors survive net of transaction costs. Moreover, recent research assesses whether we can use mitigation strategies to ease implementation when harvesting these premia.

Novy-Marx and Velikov (2014) assess turnover and estimate transaction costs for common factor strategies. They find that the net-of-cost factor premia mostly remain significant. Exhibit 2.11 provides a summary of their findings.

*Exhibit 2.11: Net-of-cost Factor Premia, as reported by Novy-Marx and Velikov (2014)– See their Table 3. All values are monthly. Factors based on cap-weighted decile portfolios. Portfolios are rebalanced annually for most factors but monthly for low idiosyncratic volatility and momentum. Factors are return differences between two extreme decile portfolios (cap-weighted). Time period is July 1963 to December 2013.*

(Monthly)	Gross premium		Turnover	T-costs	Net premium	
	Avg.	[t-stat]			Avg.	[t-stat]
Size	0.33%	[1.66]	1.23%	0.04%	0.28%	[1.44]
Profitability	0.40%	[2.94]	1.96%	0.03%	0.37%	[2.74]
Value	0.47%	[2.68]	2.91%	0.05%	0.42%	[2.39]
Investment	0.56%	[4.44]	6.40%	0.10%	0.46%	[3.60]
Low Volatility	0.63%	[2.13]	24.59%	0.52%	0.11%	[0.37]
Momentum	1.33%	[4.80]	34.52%	0.65%	0.68%	[2.45]

In addition to assessing whether the returns to simple strategies are robust to transaction costs, research has tested adjusted implementations of factor premium strategies that try to ease implementation. Novy-Marx and Velikov (2014) test several such mitigation strategies and find that such approaches can substantially ease implementation while sustaining most of the return benefits, which often results in improvements in net of cost factor premia.

Frazzini, Israel and Moskowitz (2012) conduct a similar analysis and find that after taking into account realistic transaction costs, factor premia remain significant, especially when making adjustments to ease implementation: *"We measure the real-world transaction costs and price impact function ... and apply them to size, value, momentum, and short-term reversal strategies. [...] Strategies designed to reduce transaction costs can increase net returns and capacity substantially, without incurring significant style drift. We conclude that the main anomalies ... are robust, implementable and sizeable."*

Moreover, Amenc, Goltz and Lodh (2012) provide a clear implementation framework for factor-tilted indices in a long-only context with an aim of providing factor-

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tilted indices which are not only implementable, but also well-diversified. Practical implementations of such well-diversified indices lead to risk/return improvements over simple cap-weighted quintile portfolios,<sup>20</sup> as well as considerable investability improvements through lower turnover and fewer average days to trade at rebalancing (Amenc et al., 2016).

In summary, while much of the early evidence did not consider practical implementation issues, more recent research confirms that the standard factors lead to rewards even net of implementation considerations. Moreover, straightforward adjustments to strategy design that ease implementation lead to even more pronounced premia net of transaction costs. Therefore, there is a strong case that academically-grounded factors can be used to design implementable strategies. Given this evidence, when considering deviating from academic factor definitions, investors should be careful to not throw out the baby (academic grounding) with the bathwater (unrealistic assumptions on implementation issues).

### *Conclusion: What “academic grounding” does not mean*

The fact of the matter is that many factor-investing strategies and indices offered by product providers create a considerable mismatch with academic definitions. Exhibit 2.12 provides an overview of factor definitions retained in several commercially-available factor indices and contrasts them with the Fama and French (2012, 2014) factor definitions, which are widely used in academic research, and which test either the empirical evidence on these factors or assess their economic rationale.

Exhibit 2.12: Mismatch with Academic Factor Definitions – Examples

Provider	Value	Momentum	Quality
Fama-French (2012, 2014)	Price to Book	Past 12-month return (omitting last month)	ROE (operating profits divided by book equity)
Goldman Sachs Equity Factor Index World	Value score from proprietary risk model (Axioma) relative to stock's regional industry group	Residuals from cross-sectional regression of 12-month return (omitting last month) on stock volatility	Composite based on asset turnover, liquidity, ROA, operating CF to assets, accruals, gross margin, leverage
MSCI Multi Factor Indices	Sector-relative composite based on Enterprise Value/Operating CF, Forward P/E, Price to Book	Composite score based on excess return divided by annual volatility over past 12 months and past six months	Composite based on return on equity, standard deviation of earnings, debt-to-equity
FTSE Global Factor Index Series	Composite based on cash flow to price, net income to price, and country-relative sales to price	Mean/Standard Deviation of “average residual” from 11 rolling window regressions of past 36 months returns on country and industry index	Composite based on operating CF to debt, net income to assets, annual change in (sales over assets), accruals
Deutsche Bank Equity Factor Indices	Composite based on inverse of Enterprise Value to EBITDA and dividend yield	12-month return (omitting last month) minus risk adjustment times idiosyncratic volatility score	Composite based on return on invested capital and net operating assets growth

The mismatch between the provider definitions and the standard academic definitions is striking. While the Fama and French definitions rely on straightforward variables and make a choice of selecting one key metric to come up with a factor score for each stock in a transparent and simple way, the proprietary definitions

20 - On average across six well-documented factors, diversified multi-strategy indices have a Sharpe ratio of 0.7 compared to an average Sharpe ratio of 0.56 for cap-weighted quintile portfolios.

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from providers use different sets of variables, as well as various adjustments and often consist of complex combinations of several variables. For example, some factor scores are calculated relative to the industry or regional groups a stock belongs to. Some providers use such industry or region adjustments for certain variables within a given factor score while not using it for other variables making up the same factor score. Moreover, providers often use variables which are quite far removed from the original factor definition, such as the change in sales over total assets or the leverage in quality scores, as compared to the simple use of a profitability measure by Fama and French. Overall, the different index providers are in stark disagreement with how academic research defines these factors.

In general, such proprietary definitions increase the amount of flexibility providers have in testing many variations of factors and thus pose a risk of data-mining, and all the more so in that it remains unclear why these adjustments are made and in particular whether there are any fundamental economic reasons for using some of these variables and adjustments for a given factor. In fact, it appears that providers sometimes explicitly aim at selecting ad-hoc factor definitions which have performed well over short-term back-tests. As an illustration, consider the following statements from white papers that select factor definitions for factor indices based on back-testing various combinations of variables on a particular data set spanning a time period of about 13 years:<sup>21</sup>

- *"For each composite value index, factors are selected on the basis of the most significant t-stat values"*
- *"Our preferred measure of momentum is the Residual Sharpe Ratio, which displays relatively high risk-adjusted performance outcomes, and relatively low levels of volatility"*

Moreover, some providers have launched "enhanced" factor indices which replace the factor definitions in their standard factor indices with new and improved recipes.

Of course, selecting proprietary combinations or making proprietary tweaks to variable definitions offers the possibility of improving the performance of a factor index in a back-test. The question is whether the improvement of the "enhanced" factor definition will also hold going forward, especially if there is no solid economic foundation for it. There is clearly a risk that one ends up with what academics have termed "lucky factors". Harvey and Liu (2015) show that by snooping through data on a large number of candidate factors and retaining those with the highest t-stat, one takes the risk of uncovering flukes, which will not repeat out of sample. Perhaps even more importantly, it is unclear what, if anything, factors with extensive proprietary tweaks still have in common with the factors from academic research. Therefore, the empirical evidence in favour of the academic factors and their economic grounding cannot be transposed to such new proprietary factors.

In the absence of a clear relation with academic standard factors, such proprietary factor strategies are merely ad-hoc constructs resulting from product back-tests. In fact, to find out whether any of these new proprietary factors are indeed related to the well-documented academic factors one would first need to assess how they

21 - As reported in the papers "Factor Exposure Indices – Value Factor" and "Factor Exposure Indices – Momentum Factor", recovered on 1 July 2015 at [http://www.ftse.com/products/downloads/FTSE\\_Value\\_Factor\\_Paper.pdf](http://www.ftse.com/products/downloads/FTSE_Value_Factor_Paper.pdf) and [http://www.ftse.com/products/downloads/FTSE\\_Momentum\\_Factor\\_Paper.pdf](http://www.ftse.com/products/downloads/FTSE_Momentum_Factor_Paper.pdf).

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align empirically with standard factors. This point was also made clear by Eugene Fama in a recent interview. When discussing the topic of the value factor and more proprietary versions of this factor, he states, *"Now everybody talks about value... Some stuff is fly-by-night. There are like 45 versions of that and every guy has their own marketing ploy. The acid test is you put it in the three-factor model and it says it is a value portfolio."*

In the end, a minimum requirement for good practice in factor investing is to avoid creating a mismatch with academic factors. This can be achieved easily by referring to indicators for which academic research has provided thorough tests and economic explanations, and by refraining from proprietary "tweaks".

Alternatively, when using novel or proprietary factors, one needs to make sure that they are thoroughly tested (i.e. tested in very long term data, across asset classes, for robustness to data-mining and to transaction costs) as well as linked to economic mechanisms. Of course it seems like a heroic objective for a product provider to aim to replicate the work that the whole academic community has conducted on standard factors, only by assessing the robustness of its own proprietary factor. Therefore, one can make a reasonable case that proprietary factors may never be able to reach the amount of thorough testing that their standard academic counterparts benefit from.

Given the strong emphasis providers put on the "academic grounding" of their factor strategies, it is indeed surprising that they then chose to implement products which represent a gross mismatch with academic factor definitions and that do not respect the key academic principle of parsimony. Instead of paying lip service to an "academic grounding" and coming up with a marketing innovation of tweaked factors, perhaps it is time that product providers actually used academic research in their product development. Moreover, investors should hold providers to high standards and conduct thorough due diligence on the soundness of particular implementations of factor investing.

It is also worth emphasising that a key idea behind the use of simple standard factors is to obtain robustness through parsimony. Parsimony refers to the idea that one can explain "a lot" with "a little". While proprietary factor definitions may be able to explain more in-sample, they also pose a risk of picking up noise, which one can avoid with more parsimonious factor definitions such as the standard factors from the literature. The statistician George E.P. Box (1976) famously argued in favour of parsimony by writing that "over-elaboration and over-parameterisation is often the mark of mediocrity." Indeed, the parsimony of standard academic equity factor definitions may be preferable to over-elaboration and over-parameterisation of tweaked proprietary factors that are sometimes proposed by product providers.

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### 2.5. Alternatives to ETFs: Other Index-Tracking Vehicles

In addition to ETFs, there is a variety of financial products that allow simple trades of large baskets of assets: traditional index funds, futures, and total return swaps (TRS). Because of their similar features, they can be regarded—depending on the investment purpose—as alternatives to ETFs.

The closest of these alternatives are traditional index funds, which are in fact the predecessors of ETFs. Index funds can be viewed as unlisted ETFs, to which they are very similar, except that they can be bought from and sold only to the managing company of the mutual fund (primary market). As ETFs are growing rapidly, the academic literature has addressed the question of whether ETFs are replacing index funds. Agapova (2011) finds that the asset inflows to ETFs do not reflect asset outflows from conventional index funds. Blitz, Huij and Swinkels (2012) find little difference in terms of benchmark relative performance between European index funds and ETFs. However, Guedj and Huang (2008) show that ETFs can be substitutes for index funds that track large, broad, well-diversified and liquid indices because both of them offer investors a fairly identical investment vehicle. Overall, there is no clear consensus in the literature as to whether the growth of ETFs is coming at the expense of index funds, and there is relatively little recent evidence that account for current investor perceptions.

Investors can also opt for derivative instruments (futures and TRS) to trade large baskets of assets. Futures are standardised forward contracts that make it possible to trade baskets of assets (bonds, equities, or commodities) at a

certain date in the future. Since these derivatives are traded on-exchange, they are highly liquid. Total return swaps (TRSs), by contrast, are not traded on-exchange; they are OTC contracts. Here, the total return of an index or a single security is swapped for fixed regular cash flows. A TRS is similar to a standard swap except that the total return (cash flows plus capital depreciation/appreciation), not cash flows alone, is swapped. As with any swap, the parties do not transfer actual ownership of the assets. TRSs expose investors to counterparty credit risk because they are traded OTC, whereas futures are exchange-traded instruments and thus benefit from clearing-house mechanisms that mitigate counterparty credit risk.

### 2.6. Benefits and Uses of ETFs

Given that they are hybrids of stocks and funds, ETFs provide institutional and private investors with a number of combined benefits and, as a result, improve the ways they invest. ETFs are much easier to trade than funds. Moreover, a single ETF trade can provide much broader exposure than a single stock trade. They are also tax efficient.

#### Ease of trading

The ease of trading ETFs is the result of their liquidity and transparency. The advantage of highly liquid markets such as the ETF market is that large amounts of assets can be traded without making a large impact on the market. The liquidity of ETFs stems from their listing on-exchange and from direct provision of ETFs by authorised participants. Investors can enter or exit at any time. Small trades can be executed whenever the exchange is open and at market prices that change from moment to moment, which shows a higher degree

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of liquidity than traditional index funds, priced once a day at the close. Any type of order used in trading stocks can be used in trading ETFs. For larger trades, ETF shares can be handled efficiently by authorised participants under the in-kind creation and redemption process.

### Transparency

ETFs are considered more transparent than mutual funds. The detailed composition of the fund is published on a daily basis, and the NAV is frequently computed and made available to the market during trading hours. Investors are able to see what exactly goes into the ETF, and the investment fees are clearly laid out. In the light of pricing scandals that have affected the mutual fund industry, the transparency of ETFs has become quite a draw; indeed, at the outset, it served as an impetus for the growth of the market.

### Cost

One of the primary advantages of ETFs is that they offer all of the benefits associated with index funds at much lower cost. Because of the essence of index-tracking, ETFs obviously charge less than actively-managed funds. Moreover, even though, like stocks, they involve commissions, their lower costs may make them more attractive than traditional index funds. It is useful to distinguish two aspects of costs, TERs and transaction costs.

Firstly, ETFs charge management fees and other operating fees. The TER offers a fair standard by which to compare such costs, since management fees alone might lead to misconceptions.

Secondly, ETF shares must be bought by investors, either on or off exchange, and the investor incurs transaction costs. If ETF

shares are bought or sold on-exchange or OTC, the investor incurs transaction costs that amount to brokerage fees, as well as half the bid/ask spread. If ETFs are bought at an unknown NAV, the investor does not bear costs in form of bid/ask spreads, but in the form of creation/redemption costs.

Costs differ significantly from one ETF to another. Differences are found in both TERs and transaction costs (either bid/ask spreads or creation/redemption fees). These differences are not merely a result of the different index or asset class tracked by the ETF; indeed, the costs of ETFs that track similar segments or even the same index may differ.

The cost advantage of ETFs over other indexing instruments obviously depends on the benchmark. For large institutional investors, mandates to replicate an index are usually less costly but also less liquid than an ETF. But ETFs usually charge less than other open-ended index funds. Moreover, the costs are specific to the context in which the index products are used. In particular, the position size and frequency of trading determine the relative merits of each instrument. Kostovetsky (2003), for example, finds that for large investments ETFs are preferable to index funds, while for small amounts, the high transaction costs make ETFs less attractive unless the holding period is long. Gastineau (2001) notes the reasons that make ETFs more cost efficient than index funds. First, ETFs are usually very large funds, allowing economies of scale and, second, expenses for the transfer agency function of mutual funds are not incurred with ETFs.

## 2. Background

### Obtaining broad and diversified market exposure

ETFs allow investors to gain instant and diversified access to various markets. Once an investor buys an ETF, he gets exposure to the entire market for the underlying assets and diversification of systematic risk. Moran (2003) has argued that ETFs are a useful means of achieving diversification. In addition, the portfolio of ETFs can provide more customised diversification. A cautious investor who wants to invest in real estate and fixed-income, for example, could easily form a portfolio by trading ETFs that track real estate indices and fixed-income ETFs, and he could structure the fixed-income portion by splitting it into medium-term and short-term bonds or government bonds and corporate bonds. Miffre (2006) has shown that the ability to construct portfolios of country-specific ETFs makes it possible for the equity investor to obtain risk-adjusted performance better than that obtained by holding a global index fund.

### Trading with high tax efficiency

Tax-conscious investors have lately begun to prefer ETFs to mutual funds. The special tax rules on conventional mutual funds require that realised capital gains be passed to shareholders, a requirement that is widely regarded as increasing the tax burden on buy-and-hold investors (Dickson and Shoven, 1995; Dickson, Shoven and Sialm, 2000). Although ETFs are subject to the same tax rules as mutual funds, their distinct "redemption in-kind" mechanism, allowing an investor to redeem a large number of ETF shares by swapping ETFs for the underlying stock, does not incur capital gains. Poterba and Shoven (2002) compared the before- and after-tax returns of SPDR (an ETF that holds the securities in the S&P 500) and

the Vanguard Index 500 fund from 1994 to 2000 and they find that tax effects are favourable for the ETF. Some investors even use ETFs for such tax manoeuvring as realising capital losses and getting around restrictions on wash-sales (Bansal and Somani, 2002).<sup>22</sup>

We now turn to more specific ways of using ETFs. These strategies offer more flexible approaches to investors than simple long positions in a given asset class or segment. We provide below an overview of advanced types of ETF products, as well as of advanced ways of using ETFs in portfolio practice.

### Inverse ETFs

Inverse ETFs, also called short ETFs, are supposed to provide investors with the inverse of the performance of an index, which is achieved through short-selling. In addition, these ETFs provide investors with the money market interest on the amount invested and interest earned on the short position.

### Leveraged ETFs

Leveraged ETFs provide investors with more aggressive exposure to the underlying index, without the operational hassles of making leveraged investments themselves. Leveraged ETFs usually attempt to provide constant leverage in such a way that the excess returns of the index are magnified by, say, a factor of two for the holder of a leveraged ETF. There are also leveraged versions of inverse ETFs, so investors can magnify their inverse exposure in a simple trade.

### Options on ETFs

Options on ETFs began trading on derivatives exchanges shortly after the introduction of ETFs. These instruments are limited to a relatively narrow range

22 - A wash-sale is the sale of a security at a loss followed by the immediate repurchase of the identical security. Wash-sales are used to reduce the tax burden, since other capital gains can often be offset by these capital losses and thereby reduce total taxable gains.

## 2. Background

of the most successful ETFs. The possible advantages of these options include precise exposure to the underlying fund, minimum investments lower than those required by index options, as well as physical delivery of the underlying asset if the option is exercised (index options, by contrast, are settled in cash). The main difference between ETF options and index options is that ETF options are American style which means early exercise is possible, whereas index options are typically European style which does not allow early exercise

### ETFs following an option-based strategy

A "buy-write" strategy, also called a covered call, is a commonly used approach to generate income. Such a strategy can be implemented by buying the underlying and writing call options on the underlying. In the long run, the covered call will reduce the volatility of the portfolio compared to the naked position of holding the underlying alone by giving up some return in the bull market (Benjamin and Moran, 2008). The introduction of ETFs<sup>23</sup> in such a strategy could facilitate investors building up the portfolio without facing the implementational hassles of implementing such a strategy themselves.

### Shorting ETFs

Unlike traditional index funds, ETFs may be sold short. Since ETFs can be borrowed and sold short, long/short strategies are possible. With these strategies, long/short exposure to different style or sector indices can be used to capitalise on return differentials between categories while maintaining low or zero exposure to market risk. As a temporary way to become defensive without incurring transaction costs and undesirable

capital gains, this mechanism can be used in various ways, including more sophisticated trading strategies involving shorting some combination of several indices. In addition, ETFs can be sold short, as part of a purely speculative trade, to take advantage of market downturns.

### Lending ETF units

ETF units held by an investor may be lent out to generate additional income for the portfolio. Interest paid by the borrower of the ETF may compensate for management fees and generate income above the management fees in the ETF.

### 2.7 Tracking Error and Liquidity

Tracking error and liquidity are the two most crucial criteria for evaluating the quality of an ETF. So it is important to know how to assess them.

#### Tracking error

There are many ways to assess the tracking quality of an ETF. First, and quite evidently, it is possible to analyse the difference between the returns on the ETF and those on the index. Second, the correlation of the two assets can be used to determine the tracking quality. Another simple method of analysing tracking error is to compare the mean returns of both assets. There are, however, more sophisticated means of evaluating tracking error. These means include asymmetric or downside tracking error (which is the relative return equivalent to downside risk measures such as semi-variance in an absolute-return context), co-integration analysis (see Engle and Sarkar 2006 for an application to the tracking quality of ETFs) or Bayesian analysis (see Rossi 2012 for an explanation of their approach which decomposes tracking error into temporary and permanent components).

23 - For instance, Lyxor has offered ETF EURO STOXX 50 BuyWrite since January 2007.

## 2. Background

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### Tracking Error across Different Types of Indices

The number of ETFs has been growing steadily over the past decade. Though the purpose of an ETF is to track the underlying index, not all ETFs could achieve this objective with the highest accuracy. There are a number of studies dedicated to investigating the differences in tracking error across various types of indices.

Rompotis (2011) studies three active ETFs and three corresponding passive ETFs in the US and finds that the active ETFs have higher discrepancy than their passive counterparts in terms of index returns. This is easily explained by the fact that the purpose of active ETFs is not to track the index, but rather to beat it. It is expected that active ETFs would have higher tracking error. ETFs built on strategies such as leveraged ETFs and inverse ETFs also experience higher deviations compared to the traditional ETFs (Rompotis, 2010a).

Other than the difference between active and passive ETFs, liquidity may also affect the tracking error. Ackert and Tian (2000) finds that MidCap SPDRs trade at a large discount, whereas the price of Large Cap SPDRs does not differ significantly from their NAV. Rompotis (2008, 2010b) also shows that the tracking error is positively affected by the bid-ask spread, which is the commonly used indicator for liquidity. Vardharaj, Fabozzi and Jones (2004) find that the tracking error tends to increase when the volatility of the benchmark increases.

Rompotis (2009) also finds that ETFs that track international indices have higher tracking error than those tracking local country indices. This difference in tracking error comes from the expense ratio and the volatility of the ETFs. Jares and Lavin (2004) analyse ETFs traded in the US market but that have significant exposure to the Asian markets and find that the less overlapping hours there are between foreign stock exchanges and the US exchanges, the more the tracking error there is. A similar conclusion was reached by Johnson (2009), who analysed 20 foreign country ETFs which tracked the S&P 500. In addition, Maister et al. (2010) show that ETFs that track emerging market indices exhibit higher tracking error than those that track indices in other market segments. They conclude that the major source of this increase in the ETF tracking error relates to the SEC diversification requirements, as some of the indices have overweighted certain companies beyond the limits set by the SEC. This means that regulation prevents funds from matching the actual index weights.

Unlike the previous studies, which mainly focus on equity ETFs, Drenovak, Urošević and Jelic (2010) investigate the driving factors for sovereign ETFs that track error. They showed that the fixed-income tracking error is affected by the maturity, and the average CDS spread of the constituents. Bond ETFs with longer maturities as well as widening CDS spreads would tend to have more volatile tracking error.

## 2. Background

### ETF Tracking Quality

The tracking quality of ETFs may be characterised by several indicators, including not only the tracking error but also the tracking difference. The tracking difference is the difference between ETF total return and the total return of the replicated index, while the tracking error evaluates the volatility of the difference in return between an ETF and its benchmark. Bonelli (2015) shows that depending on whether we consider the level of tracking error or the level of tracking difference, the ranking of ETFs that track the same index may greatly differ. For example, he observes that tracking error varies significantly across the different ETFs that all track the MSCI World Index (from 0.02% to 0.22%). The ETF with the lowest tracking error relative to the index has one of the highest tracking differences (-0.42%), and thus greatly underperforms its benchmark, while an ETF which has one of the highest tracking errors (0.21%) is also the one with the lowest tracking difference (-0.19%). Similar results were obtained for two other indices, namely the MSCI Emerging Markets Index and the MSCI Europe Euro Index. Bonelli (2015) concludes that tracking error is not representative of the under- or outperformance of ETFs with respect to their benchmark, but serves first of all to evaluate the relative risk of daily deviations and is of more concern for short-term, rather than for mid-term or long-term, investors. Long-term investors may be more interested by tracking difference, as its level provides information about ETF costs. Indeed, if ETF replication was perfect, the tracking difference would be equal to the ETF expense ratio. Thus, the lower the tracking difference, the lower the expense ratio is.

### Liquidity

The second key issue with indexing instruments is liquidity. Practitioners, of course, are highly familiar with liquidity, but the finance literature has yet to come to a consensus on theory and on empirical methodology. Practitioners, for example, have long used a number of liquidity measures, but academic articles continue to debate their merits. Popular liquidity indicators are market spreads, turnover, and AUM. Several authors in the finance literature have proposed more advanced liquidity measures, as proposed by Amihud (2002) and Acharya and Pedersen (2005).

Of course, the number of transactions in ETF shares is not necessarily indicative

of the liquidity of an ETF. For several reasons, in fact, ETFs may be classified as highly liquid even if relatively few ETF shares change hands. The first is that the market maker has a contractual obligation towards the stock exchange and towards the ETF provider to fulfil its role as market maker for a given transaction size and with a determined maximum spread. Therefore, even if trading volume is low on a given day, ETF investors can trade at any time of the day. The second reason is that in Europe most ETF transaction volume actually takes place off exchange, either by trading ETF shares OTC or at unknown NAV. The volume traded on-exchange is thus not a reliable indicator of the actual transaction volume.

## 2. Background

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The true liquidity of an ETF is the liquidity of the underlying securities. After all, any deviation of the price of the ETF from the price of the basket of securities is easily arbitrated away through the creation and redemption mechanism. This arbitrage depends only on the liquidity of the underlying securities. As described above, the market maker swaps ETF units with the ETF custodian for the basket of securities of the ETF, so it is the liquidity of securities in this basket that matters.

The bid-ask spread is a common indicator of an asset's liquidity. It has been documented in detail how the bid-ask spread of an ETF can be broken down into its components (see Amundi ETF, 2011). Since market makers have to make a hedge when they trade ETFs with clients, one part of the ETF spread is reserved for them to buy/sell the underlying. Usually, the ETF bid-ask spread comprises five components: the spread of the underlying, taxes, exchange costs, the carry cost of the ETF as well as the margin of the market maker. In this case, the spread of the ETF will often be affected by the location of the underlying market, the number of constituents, the trading hours and the size of the order.

Calamia, Deville and Riva (2013) provide extensive empirical evidence on the drivers of bid-ask spreads. Their results suggest that the size of an ETF (in terms of AUM or volume traded), the replication method, and market fragmentation influence the bid-ask spread (also see Stoll (2000), Rompotis (2010b), or Agrawal and Clark (2009) for analyses of determinants of bid-ask spreads). Thirumalai (2004) shows that there is a positive relationship between the bid-ask spread and volatility – securities which are more volatile tend to have larger spreads. Furthermore,

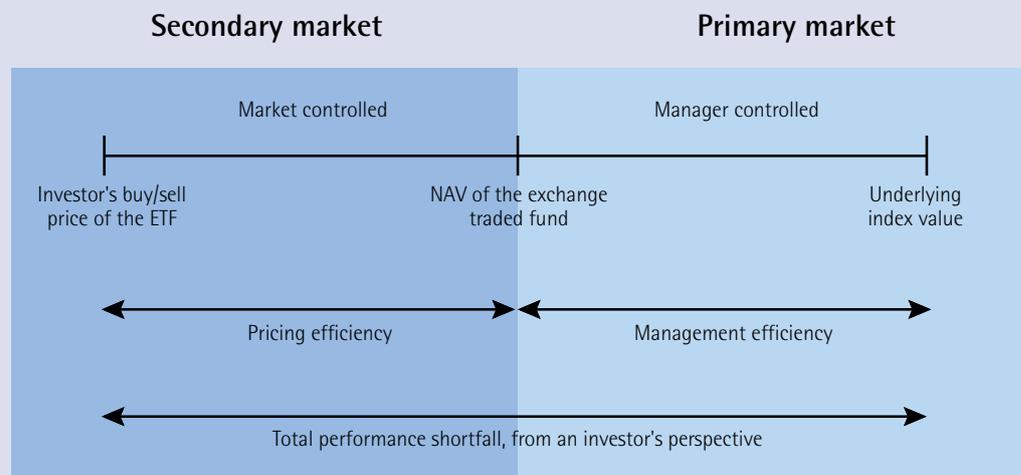
Rompotis (2008, 2010b) demonstrates that the bid-ask spread is positively related to the absolute value of the premium (the difference between the price and the NAV) as well as the tracking error. According to these empirical results, higher bid-ask spreads tend to occur together with higher volatility and tracking error.

## 2. Background

### Pricing and Performance Drift

Although index ETFs are designed to track an index passively and provide exposure to its risk and performance features, ETFs that for legal reasons cannot fully replicate an index need to be managed more actively. Any deviation of an ETF's returns from the underlying index returns results in a performance gap. Unlike index funds, which can be bought and sold only at their daily NAV, ETFs can be exchanged in secondary markets at ask/bid prices that may differ from their NAV. Exhibit 2.13 provides a description of the sources of deviation that ETFs may encounter.

Exhibit 2.13: Performance Shortfall of an ETF



For an investor, the total performance shortfall (or gain) is the right measure with which to identify the gap between the performance of the ETF and that of its underlying index. This gap should be measured as the return difference between the underlying index and the ETF – taking into account the investor's actual buying price. This price, however, is not easy to obtain, and might require studying specific transactions to take into consideration the specific market impact of such trades.

The total performance shortfall can be conceived as the sum of the ETF management inefficiencies and market inefficiencies. Since the former lie within the ETF management itself, they can be controlled by the fund management company. Given that they depend on the market makers, supply and demand, and transaction costs, the latter are beyond the control of the ETF company.

### Net Asset Value versus Market Price

An ETF has an NAV calculated with reference to the market value of the securities held. NAV is the total value of the fund after netting the market value of each underlying share in its holdings, cash, accruals, fees, operating costs and other liabilities and divided by the number of issued shares. For fully replicated index trackers, the NAV should be exactly the same as or very close to the fund's underlying index value (this is not true for index-tracking leveraged ETFs which offer a multiple of the return on the underlying index.) On-exchange, however, the market price of an ETF, like that of a stock, is determined by supply and demand. ETFs are bought and sold at their

## 2. Background

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market prices, which may be at a premium or discount to their NAVs. When the market price of an ETF is not equal to its NAV, arbitrage opportunities are created and the creation and redemption process brings the fund's market price back to its NAV.

The intraday NAVs of ETFs are also usually calculated every fifteen seconds by third-party vendors; the market prices of the underlying index constituents are taken into account so that investors can tell whether the ETF is fairly priced. This intraday NAV, also known as indicative net asset value (iNAV) or indicative optimised portfolio value (IOPV), is different from the daily NAV of the fund, which is computed after the market closes for the day.

In empirical studies, Marshall, Nguyen and Visaltanachoti (2012) show that ETF mispricing occurs reasonably frequently. Usually, such mispricing is small, but leveraged/inverse ETFs show greater mispricing. Marshall, Nguyen and Visaltanachoti (2012) find the mispricing due to a decrease in ETF liquidity. Petajisto (2011) finds that this mispricing is greatest for ETFs holding international or illiquid securities, which corresponds to the fact that increased transactions costs for illiquid underlying securities will deter arbitrage at smaller levels of ETF premia.

Dolvin (2010) shows that price deviation can lead to arbitrage opportunities. Shum (2010) analyses the international ETFs and shows that Asian ETFs are trading at a premium/discount compared to their underlying indices in the US as ETFs could anticipate the market reaction to the movement of the US market due to the time difference. However, Engle and Sarkar (2006) find that in the US ETFs have highly efficient prices, though their conclusions for international ETFs are different. In fact, the authors find that the premia or discounts on fund NAVs are usually small and disappear very quickly, a disappearance that confirms the view that the creation and redemption mechanism of ETFs effectively limits and destroys arbitrage opportunities.

### **Performance Drift**

Ideally, ETFs should derive their value and volatility only from the market movements of the underlying index or market prices of the constituent securities of this index. But perfect replication is not always possible; in fact, performance drift is inevitable. An index portfolio is only a paper portfolio and requires virtually no management, administration, asset buying or selling, custody, and so on. An ETF, by contrast, holds assets physically, manages them, distributes dividends and handles a relationship with investors. These operations incur costs. So to keep costs down and make sure they are consistent it is necessary to understand the components of these costs. Several costs can be a drag on ETF performance, some related to the direct costs of implementing the strategy, others to the way the index is replicated and exceptions handled.

- **Implementation:** ETFs need not replicate indices by buying or selling the underlying securities. They are paper portfolios calculated on the basis of market prices and weightings of their underlying securities. The underlying securities

## 2. Background

may not be very liquid and, given the large size of an ETF portfolio, the price of a constituent security may go up as a result of high demand during implementation. This cost, also known as portfolio construction/rebalancing cost or transition cost, which also includes the actual transaction costs, results in a performance drag on the ETF portfolio.

- **Management fees and other operational expenses:** unlike ETF portfolios, indices do not incur management fees, administrative costs and other operating expenses. Often expressed in terms of TER as a percentage of the NAV, these costs are deducted from the ETF assets and the daily NAV is affected accordingly (daily accrual). When dividends and interest income are paid, usually every quarter or twice a year, total management expenses are deducted from the payment and the NAV of the ETF returns to the index value.
- **Transaction costs in the secondary market:** investors buying or selling ETFs on-exchange through their broker must shoulder brokerage commissions, bid/ask spreads, the market impact of a large transaction, stamp duty, transaction levies charged by the exchange, and so on. These costs make ETF returns lower than those of the underlying index.
- **Cash drag:** if ETFs pay dividends they usually do so every quarter or twice a year. However, the underlying securities pay dividends sporadically throughout the year. While the index value reflects full dividend reinvestment, an ETF portfolio holds extra cash that has no capital appreciation, no returns. This generates a minor disparity between the ETF portfolio value and the underlying index value. Tracking error caused by this phenomenon is called "cash drag" because the ETF portfolio holds extra cash that drags its performance down.
- **Mispricing costs in secondary markets:** an ETF may trade at lower than (discount) its NAV or higher than (premium) its NAV. Factors such as unmatched supply and demand, illiquid underlying securities, and market inefficiency may contribute to the move of trading prices away from NAV. Since ETF shares can be created or redeemed anytime during trading hours by authorised market participants or arbitrageurs, this disparity does not last long.

On the other hand, there are also several ways that ETF managers can offset some of the replication costs. In some cases an ETF can yield higher returns than the index to be replicated through the following:

- **Securities lending:** ETF providers can lend their securities to other market participants and thereby earn lending fees.
- **Tax benefits:** in some countries it is possible to partly recover withholding taxes through the purchase of single stocks during the period of dividend payments. Blitz, Huij and Swinkels (2012) show that a large proportion of the underperformance not accounted for by the TER is due to dividend taxes.
- **Management of index events:** intelligent management of index component changes and other events can generate additional returns for the ETF. However, if done unsuccessfully, such management may also lead to underperformance of the index.

## 2. Background

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We proceed now to the presentation of the survey methodology and data. The main results of the survey – European investors' views of ETFs, the use of ETFs, and their comparative advantages and disadvantages – are found in Section 4

# 3. Methodology and Data



## 3. Methodology and Data

### 3.1. Methodology

The EDHEC European ETF survey 2015 was completed using an online questionnaire distributed to professionals within the European asset management industry, and subsequent e-mail communication with them.

This survey targeted different professional asset managers that have experiences with ETF instruments, including institutional investors, asset management companies and private wealth managers.

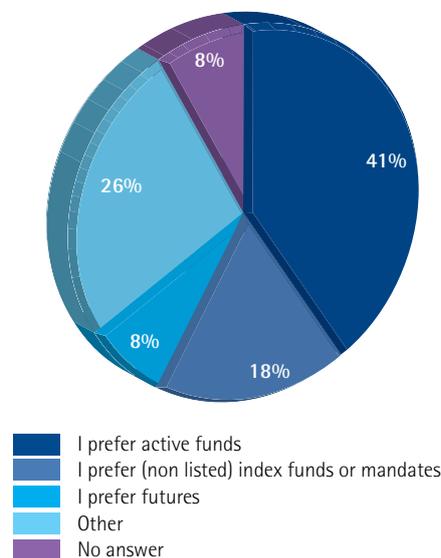
The questionnaire consisted of four sections. In the first part, the survey participants are asked about the role ETFs play in their asset allocation decisions. The next set of questions turned to some practical aspects of ETF investment, such as the satisfaction with different ETF products, as well as different applications of ETFs for portfolio optimisation. In the third set of questions, the questionnaire asks the participants to compare ETFs with other investment instruments that can be considered close substitutes: index funds, futures, and total return swaps. We also invited the survey participants to express their views on future developments in the ETF market. Finally, in the last section of the questionnaire, relating to the recent considerable development in smart beta indices, we asked respondents to provide their opinions on products that track smart beta indices and on the importance of risk factors in alternative equity beta strategies.

### 3.2. Data

The email containing a link to the questionnaire was sent out in September 2015. The first response was received on 4 September and the last on 14 October. In total, we received 219 answers to

our survey. However, 18% of them (39 respondents) declared that they have never invested in ETFs. Since our aim is to include only experienced ETF investors in this survey, we excluded these participants from the study. We did, however, ask those respondents the reason(s) why they do not invest in ETFs. From among these 39 respondents, about a quarter indicated that they use instruments other than ETFs for the purposes of passive management (with 18% indicating that they preferred non-listed index funds and mandates, and 8% stating that they preferred futures), about another quarter (26%) gave various reasons for not using ETFs, mainly relating to organisational constraints, while the main reason (41% of respondents) given by these respondents for not using ETFs was that they did not invest in passive management products and were exclusively active managers (see Exhibit 3.1). In summary, the reasons why a large majority of those 39 respondents do not use ETFs are not related to the way they judge ETFs, but rather to various constraints.

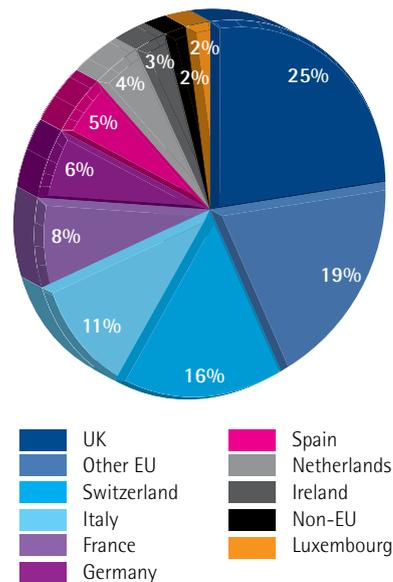
*Exhibit 3.1: Motivations for not Investing in ETFs*  
 This exhibit indicates the reasons given by respondents for not investing in ETFs. Percentages are based on the 39 survey respondents that do not invest in ETFs.



### 3. Methodology and Data

Our survey is aimed at European investment professionals. Thus, the 219 respondents to the survey are based in Europe, a large part of which are from the UK, Switzerland and Italy (52% of the respondents). The exact breakdown of the respondents' country can be seen in Exhibit 3.2. We can see from these numbers that our sample gives a fair representation of the European investment market by geography.

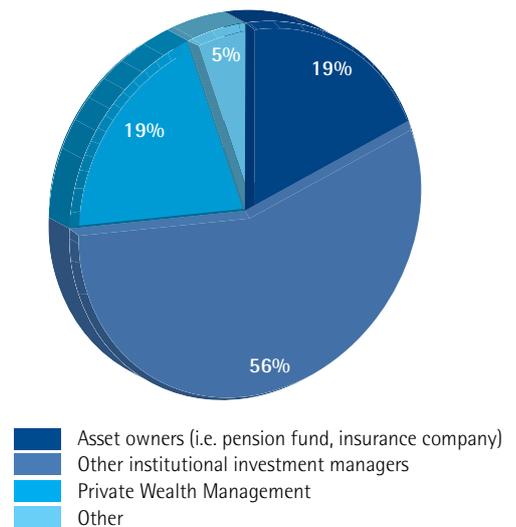
*Exhibit 3.2: Country Distribution of Respondents*  
 This exhibit indicates the percentage of respondents that have their activity in each of the mentioned countries. Percentages are based on the 219 replies to the survey.



We also asked participants about their institution's principal activity, allowing us to distinguish between professionals in institutional investment management and those in private wealth management. With 76% of the survey participants, institutional managers are the largest professional group represented in this study (the total of Asset Owners and Other Institutional Investors as shown in Exhibit 3.3). About 19% of respondents belong to the private wealth management industry. Finally, the remaining 5% is made up of other professionals within the financial

services industry, such as investment bankers or industry representatives.

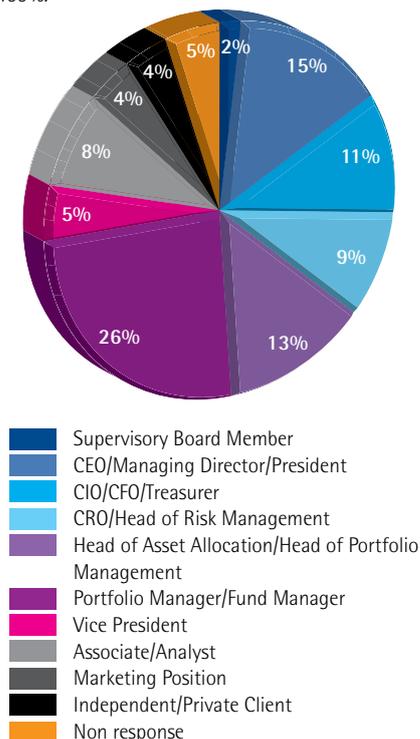
*Exhibit 3.3: Main Activity of Respondents' Institution*  
 This exhibit indicates the distribution of respondents according to their institution's principal activity. Percentages are based on the 219 replies to the survey.



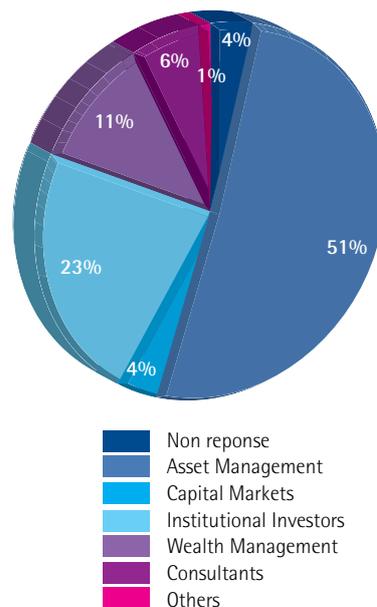
It is important to qualify respondents by their job function. In fact, we would expect that given the importance of choosing investment instruments such as ETFs or competing index products for investment organisations, it would be fairly high ranked executives or portfolio management specialists that would be most suited to answer our questionnaire. Many of the respondents indeed occupy high-ranking positions: 17% are board members and CEOs, and 33% are directly responsible for the overall investments of their company (such as CIOs, CROs, or Heads of Portfolio Management). About another quarter (26%) of the survey participants are portfolio or fund managers (see Exhibit 3.4).

### 3. Methodology and Data

*Exhibit 3.4: Function of Survey Respondents*  
 This exhibit indicates the distribution of respondents based on their positions held in the company. Percentages are based on the 219 replies to the survey. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



*Exhibit 3.5: Nature of survey respondent activity*  
 This exhibit indicates the distribution of respondents based on the nature of their activity in the company. Percentages are based on the 219 replies to the survey. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



We also ask the respondents about the nature of their activity. From Exhibit 3.5, we can see that more than half of the respondents (51%) are asset managers.

Finally, Exhibit 3.6 shows the AUM of the companies for which the survey respondents work. One-third (33%) of the firms in the group of respondents are large firms that have over €10bn in AUM. Another 45% are from medium-sized companies, with AUM of between €100m and €10bn. We also capture the opinions of small firms, with 22% having AUM of less than €100m. This feature on the size breakdown implies that the European ETF Survey 2015 mainly reflects the views of medium- to large-sized companies, which account for 78% of the respondents.

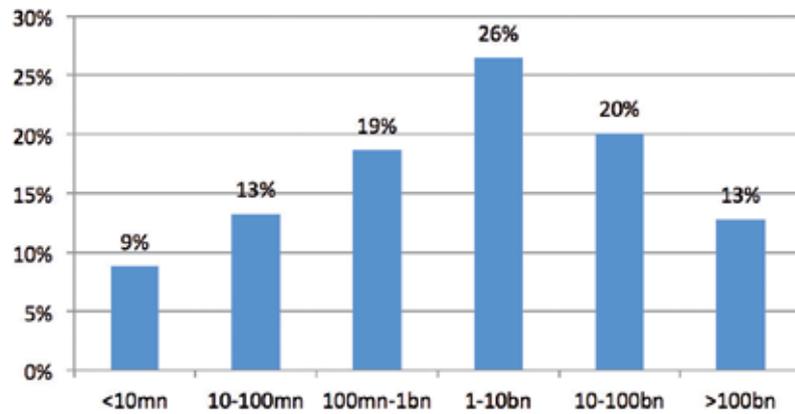
Taken together, we believe that this regional diversity and fair balance of different asset management professionals make the survey largely representative of European ETF investors. After having described the sample that our survey is based on, we now turn to the analysis of the responses that we obtained from this group of survey participants.

### 3. Methodology and Data

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*Exhibit 3.6: Assets under Management (in EUR)*

*This exhibit indicates the distribution of respondents based on the AUM which they reported. Percentages are based on the 219 replies to the survey, excluding non responses.*



## 3. Methodology and Data

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## 4. Results



## 4. Results

In this section, we present the main results of this survey and discuss possible explanations for the respondents' answers. In the first part, we take a close look at the use and satisfaction of ETFs in practice.

In addition we also invite survey participants to express their views on future developments in the ETF market, as well as to give their opinions about products that track smart beta indices, and on the importance of risk factors in alternative equity beta strategies, in relation to the recent considerable development in these types of indices. We then compare the practitioners' view on ETFs with those on investment instruments that can be considered close substitutes: index funds, futures and total return swaps. We also investigate the role ETFs play in asset allocation decisions which includes the reasons for investing in ETFs. In the last section, we compare the results of this year's survey to previous ETF surveys in order to get further insight into trends over time.

### 4.1. Use of and Satisfaction with ETFs

As ETF products have been gaining more attention in recent years, it would be useful to highlight perspectives from investors. We begin by analysing the use of ETFs in different asset classes; we then look at satisfaction with ETFs. We also look at the investment strategies used in the industry as well as the advanced uses of ETF products. We subsequently compare respondents' views on different ETF replication methods, before moving on to Section 4.1.6, which illustrates how respondents assess the qualities of ETFs in terms of liquidity, tracking error and cost. Finally, we invite survey participants to express their views on the future developments in the ETF markets and give their opinion on products that track smart beta indices.

#### 4.1.1. Use of ETFs in different asset classes

First, we look into the relative importance attached to ETFs and other investment instruments in each asset class. Exhibit 4.1 summarises the use of ETFs or ETF-like products among those investors who invest in the relevant asset classes. For instance, 91% and 86% of respondents have used ETFs or ETF-like products for their equity or sector investments respectively. 68% of respondents use ETFs to invest in smart beta, which is a strong increase compared to 2014 where less than half of them (49%) were using ETFs to invest in smart beta. 60% and 64% of respondents use ETFs to invest in government and corporate bonds respectively. Compared to the high use of ETFs in the equity class, the use of ETFs to invest in bonds appears quite weak. However, if we compare the results with those of 2014, we observe a high progression for the use of ETFs in the bond class, as in 2014, only 53% and 48% of respondents used ETFs to invest in corporate and government bonds, respectively. Within alternative asset classes, more than four-fifths (82%) of investors who invest in commodities actually employ ETFs. Volatility ETFs are used by less than one-third (31%) of investors who hold such assets, while real estate ETFs are used by 44% of investors. However, money market funds (24%), currencies (22%), infrastructure (21%), hedge funds (16%) and SRI (12%) are the asset classes in which the fewest investors have employed ETFs for their portfolios.

Hence we can see that – while ETFs are used across a wide spectrum of asset classes – the main use is in the area of equities, sectors and commodities. This is likely to be linked to the popularity of indexing in these asset classes as well as to the fact that equity indices, sector

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indices and commodity indices are based on highly liquid instruments, which makes it straightforward to create ETFs on such underlying securities. In addition, given that liquidity is one of the major benefits of an ETF, and that this is dependent on the liquidity of the underlying securities, it would make sense that ETFs based on the most liquid underlying securities are the most popular.

Concerning equity and bond classes, respondents were asked to detail the various categories of ETFs they invest in (see Exhibits 4.1.a to 4.1.c). The vast majority of respondents invest in broad market ETFs (95% for equity investment, 88% and 84% for government bonds and corporate bonds, respectively). In addition, half of them also invest in

sector ETFs (50%) for equity investments and more than half of them (55%) invest in market segment ETFs for government bond investments. This figure is the same for the ETFs by credit rating segment for corporate bond investments. The use of style ETFs within the equity asset class is much lower (37%). This is also the case for the amount of respondents that use inflation-protected bond ETFs within the government bond asset class (32%). Lastly, while 42% of respondents use maturity segment ETFs within the corporate bond asset class, only 16% of respondents use sector ETFs.

Exhibit 4.1: Use of ETFs and ETF-like products

This exhibit indicates the percentage of respondents that reported using ETFs or ETF-like products for asset classes/investment styles that they have already invested in/used. We also displayed 2014 results to show the evolution of results between the two years. The percentages have been normalised by excluding the non-responses.

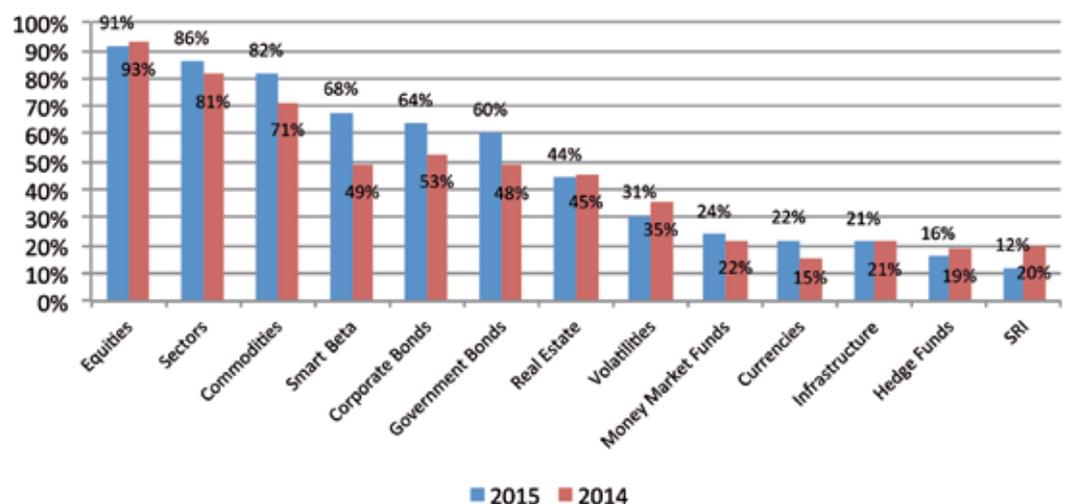
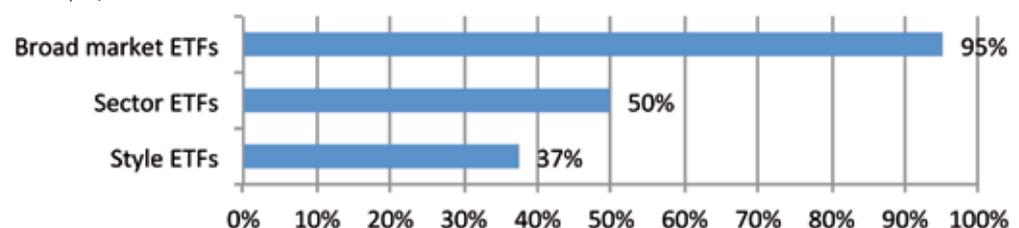


Exhibit 4.1.a: Categories of Equity ETFs Respondents Invest In

This exhibit indicates the categories of equity ETFs respondents invest in. The percentages are based on the sole respondents that invest in Equity ETFs.



## 4. Results

Exhibit 4.1.b: Categories of Government Bond ETFs investors invest in

This exhibit indicates the categories of government bond ETFs respondents invest in. The percentages are based on the sole respondents that invest in government bond ETFs.

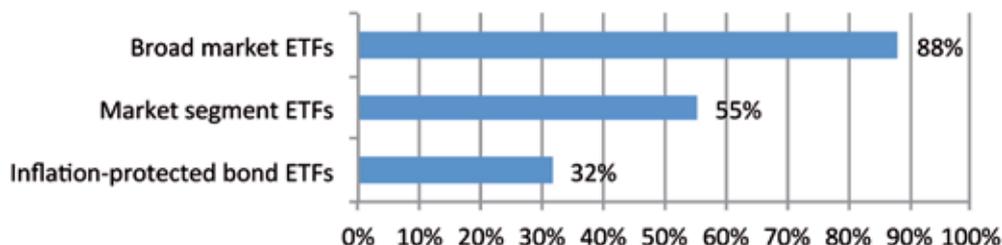
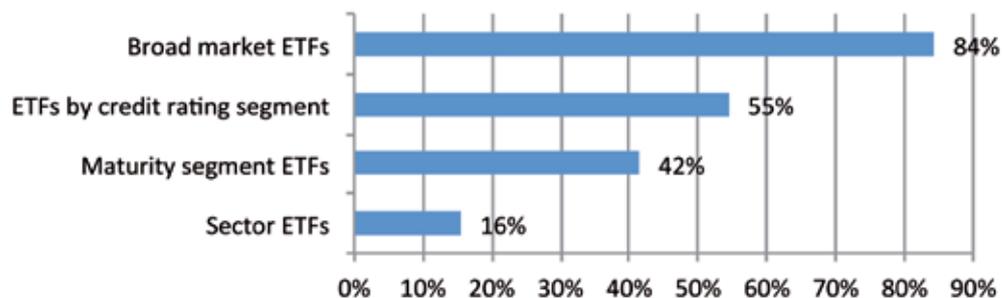


Exhibit 4.1.c: Categories of Corporate Bond ETFs investors invest in

This exhibit indicates the categories of corporate bond ETFs respondents invest in. The percentages are based on the sole respondents that invest in corporate bond ETFs.

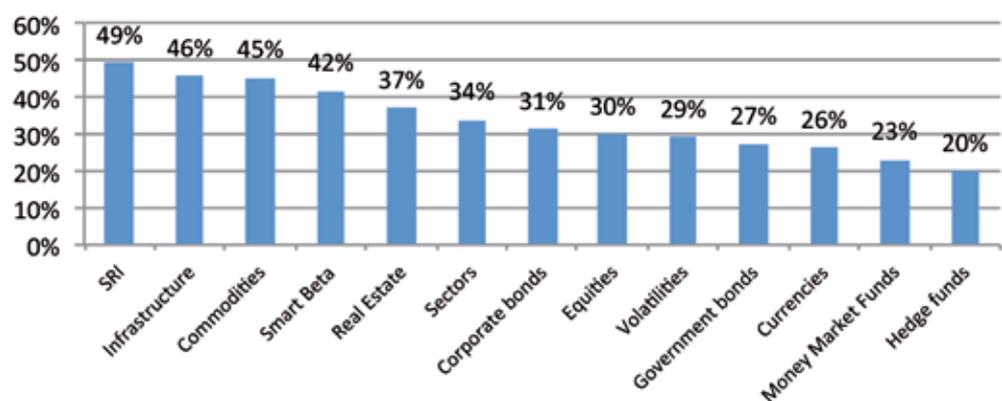


Thus, it appears from the three exhibits that, for both equities and bonds, investors use broad market ETFs much more frequently than ETFs based on finer market segments. This may possibly be explained by the fact that offerings on the finest segments are generally more recent, less known and less suited to the needs of investors.

For each asset class, Exhibit 4.2 shows the percentages of the amounts invested that are accounted for by ETFs or ETF-like products. It differs from the questions asked in Exhibit 4.1, which shows the rate of ETF usage for those respondents who invest in the respective asset class/investment category. Here, Exhibit 4.2 reflects the intensity of usage for those

Exhibit 4.2: The Percentage of Total Investment Accounted for by ETFs or ETF-like Products

This exhibit indicates the average percentage of total investment accounted for by ETFs or ETF-like products for each asset class. We only consider respondents that do use ETFs for the given asset class. Thus the percentage indicates the volume invested in ETFs compared to all investments in the asset class, for those respondents who do use ETFs. The percentages have been normalised by excluding the non-responses.



## 4. Results

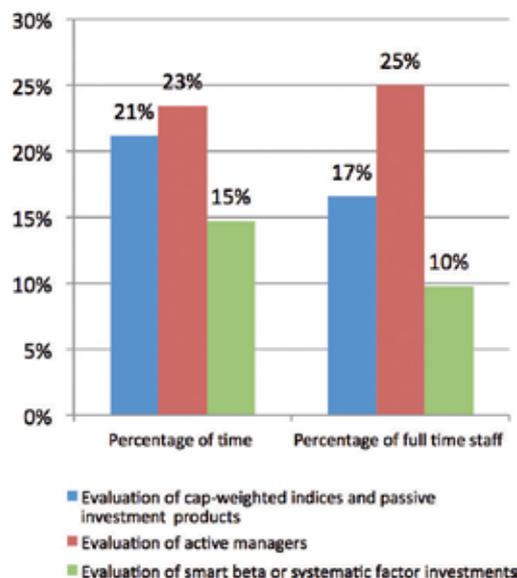
investors who do use ETFs. It shows that ETFs account for a sizeable share of overall assets across different asset classes.

Indeed, for the average respondent to this question, they account for 49% of total SRI investment, 46% of infrastructure investment, 45% of commodity investment, 42% of smart beta investment, 37% of real estate investment, 34% of sector investment, 31% of corporate bond investment, 30% of equity investment and 29% of volatility investment. Government bond ETFs and currency ETFs accounted for 27% and 26% of average investment in this asset classes, respectively. Money market fund ETFs accounted for 23% of average investment in this asset class. Hedge funds have 20% invested via ETFs in their universe. Hence the results of these two questions show that not only are ETFs widely used across most asset classes, but they also make up a significant proportion of investors' portfolios.

Respondents were then asked about the resources they employed for the

evaluation of investment strategies and products within their organisation. The results are displayed in Exhibit 4.3. The average percentage of time personally spent by respondents appears to be consistent with the percentage of full-time staff concerned with investment strategy evaluation. While respondents spent comparable amounts of their time evaluating passive management and active managers (21% and 23%, respectively), they only spent 15% of their time evaluating smart beta and systematic factor investments. Differences are even greater when it comes to the percentage of full-time staff involved in evaluating the different forms of investment. While a quarter of full-time staff is dedicated to the evaluation of active managers, only 17% of full-time staff is employed for the evaluation of cap-weighted indices and passive investment products, and only 10% for the evaluation of smart beta or systematic factor investments. It is striking that the highest resource allocation is given to the evaluation of active managers. Moreover, a striking gap

*Exhibit 4.3: Resources Employed for the Criteria of Evaluation of Investment Strategies and Products within your Organisation*  
This exhibit indicates the average percentage of time personally spent by respondents on evaluating passive investment, active managers and smart beta or systematic factor investments, respectively, as well as the percentage of full time staff involved in the evaluation of passive investment and active managers and smart beta or systematic factor investments, respectively.



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exists between the resources allocated to smart beta evaluation and the resources allocated to evaluating either traditional active management or traditional passive management products. Resources allocated to smart beta product evaluation clearly lag behind. With the increasing popularity of smart beta products, more resources should be devoted to evaluating the various offers. However, our results suggest that investors do not necessarily have the adequate resources for smart beta, which is a more recent phenomenon and which constitutes a new category in between traditional passive and active management.

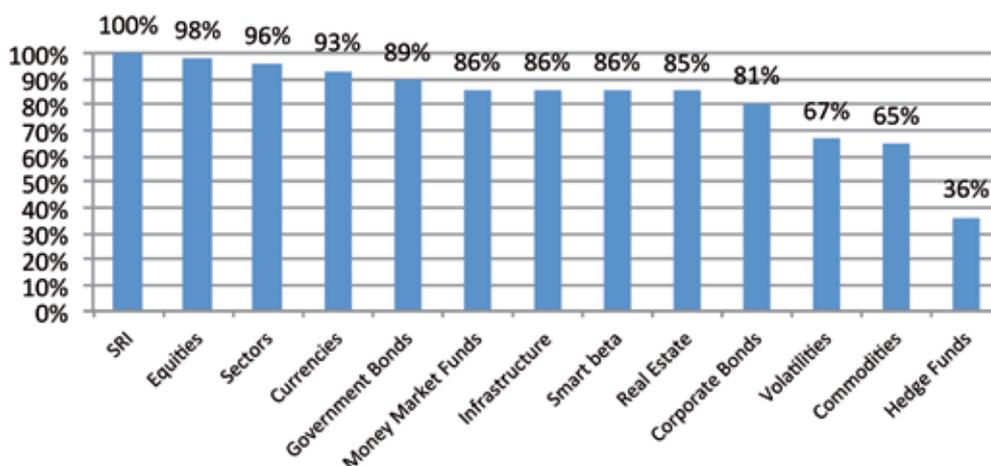
### 4.1.2. Satisfaction with ETFs

We continue our analysis with a general assessment of the satisfaction of ETF products by asset class. Only those respondents who use ETFs in the respective asset class are asked to report their degree of satisfaction. This means that our results can be interpreted as the satisfaction rates of investors who actually have experience in using ETFs. Exhibit 4.4 shows that, across all asset classes, a large majority of users are satisfied with their ETFs. Satisfaction is remarkably high (more than

80%) for ten out of thirteen asset classes, including SRI, equities, sectors, currencies, government bonds, money market funds, infrastructure, smart beta, real estate, and corporate bonds. This is particularly so for SRI, equities, sectors and currencies, each with satisfaction rates in excess of 90%. Volatilities and commodities have lower satisfaction levels, although these are still in the 60% to 70% bracket. The lowest level of satisfaction, obtained for the hedge fund class, is not too bad as 36% of users are satisfied.

It should be noted that the samples for infrastructure and SRI ETF users were especially narrow, with only 7 and 4 respondents using ETFs in the infrastructure and SRI asset classes, respectively. The reasons for satisfaction or dissatisfaction may vary by asset class. Constructing truly representative indices in alternative asset classes may be a challenge, especially when doing so involves attempts to attain the investability which is necessary to construct an ETF where effective arbitrage can take place. There is often a trade-off between investability and representativity, with index providers limiting the constituents of hedge fund

Exhibit 4.4: If you use ETFs or ETF-like products, are you satisfied with them?  
This exhibit indicates the percentage of investors who are satisfied with ETFs or ETF-like products they have used for each asset class. The percentages have been normalised by excluding the non-responses.



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indices to be the most investable, but by excluding certain funds, representativity will be decreased. Another problem faced when constructing a representative index is that there is a lack of informational disclosure with regard to performance by a large number of hedge funds that should be part of the index due to a lack of regulation requiring such disclosures (Goltz, Martellini, and Vaissié, 2007.) Similar to issues with hedge fund indices, the construction of volatility indices also requires the presence of a liquid option market, which raises the challenge of enhancing the availability of the product range (Whaley, 2008; Goltz et al., 2011). We notice that the ETFs with the highest and most consistent satisfaction rates over a period covered by our surveys are those based on the most liquid asset classes and we discuss this along with other time trends in Section 4.5.

It is interesting to note that volatility indexes have scored the third lowest in terms of satisfaction rates. This may be related to the fact that they do not directly track a volatility index but a volatility futures index. This does not result in accurate exposure to the volatility index, whose changes in value can be quite different to those of the volatility futures index. This effect has been discussed in detail by Goltz and Stoyanov (2012). Commodity indexes scored the second lowest in terms of satisfaction rate. There are many different commodity indexes (see Feldman, 2006; Dunsby and Nelson, 2010; Arnott et al., 2014), but no consensus on which is the best index. If investors are not satisfied with commodity index construction rules, they will be less satisfied with ETFs based on those indexes, compared to other asset classes.

Moreover, when it comes to alternative asset classes, it may not be easy to implement economically meaningful long-only exposures. In particular, while long-only (and thus easy-to-implement) exposure to standard asset classes such as stocks and bonds provides access to a number of well-documented risk premia (such as the equity risk premium for stocks, and the credit and term premium for bonds), many alternative asset classes do not necessarily give access to risk premia through long-only investing. For example, it has been argued that long/short positions in commodity futures are necessary to capture risk premia in commodity markets while long only exposure to commodity prices is not expected to give rise to any risk premium (see for example Fuertes, Miffre and Fernandez-Perez, 2013).

### 4.1.3. Trading ETFs

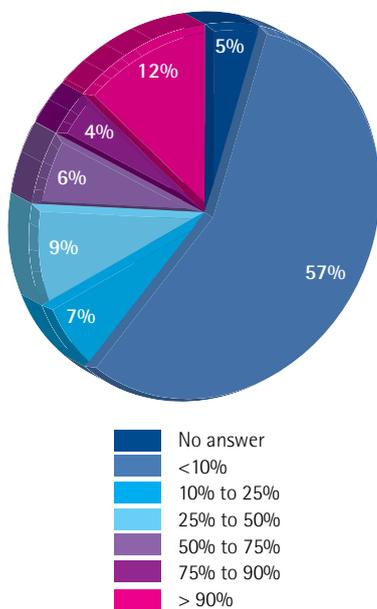
One of the great advantages of ETFs is that they can be easily traded on conventional stock exchanges. So we asked respondents how much of their ETF trading is done OTC rather than on an exchange. Although more than half of the respondents (57%) do not trade a significant share of their ETF investments over-the-counter, 22% of respondents execute more than half of their ETF trading on OTC markets (see Exhibit 4.5). It is not surprising that a large proportion of ETF trading takes place OTC (see Background section 2.6) as this allows for a saving on costs. For instance, by doing so, investors can avoid paying transaction costs and only need to pay the creation fees from the ETF provider. There is also the fact that trading OTC allows more flexibility with regard to negotiating specific elements of the trade such as country of settlement or specific settlement dates to more precisely match the investor's requirements.<sup>24</sup> The

24 - <http://etf-radar.com/magazine/?portfolio=trading-etfs>

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percentage of respondents who have reported trading more than 90% of their ETF investments on OTC markets which has stabilised from 2011 to 2013 at 9%,<sup>25</sup> is still in 2015 at the 12% level reached in 2014.

*Exhibit 4.5: How much of your ETF trading is done OTC rather than on-exchange?  
This exhibit indicates the distribution of respondents according to the percentage of total trading volume done OTC. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.*



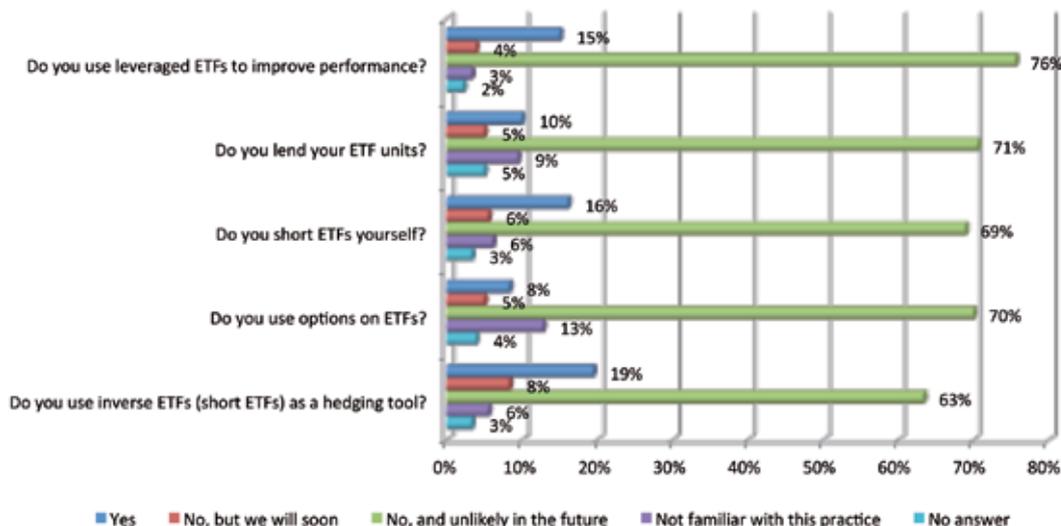
25 - The percentage is taken from the EDHEC-Risk European ETF Surveys from 2011 to 2014.

### 4.1.4. Advanced ETF products and advanced uses of ETFs

As mentioned in the Background section, ETFs stand out for a number of advanced features. Exhibit 4.6 summarises how these features are used by European investors and asset managers. We ask in particular about the use of inverse and leveraged ETFs, options written on ETFs, short-selling of ETFs and the use of ETF shares in securities lending.

We can see from this chart that ETFs packaged with advanced trading strategies (inverse or leveraged ETFs) are still widely used (by about one-fifth and one-sixth of respondents, respectively), despite the recent appearance of such instruments. We also ask whether those respondents who currently do not employ these advanced uses of ETFs, intend to do so in the future. We can see that we should expect the percentage of respondents using ETFs in advanced ways to increase a little bit, as 8% and 4% of respondents, respectively, declare they will be using them soon. In addition to this, we could also expect increases in usage as investors who answer that they

*Exhibit 4.6: Advanced use of ETFs  
This exhibit indicates the adoption of advanced use of ETFs. Non-responses are reported as "no answer" so that the percentages for all categories in each advanced use of ETFs add up to 100%.*



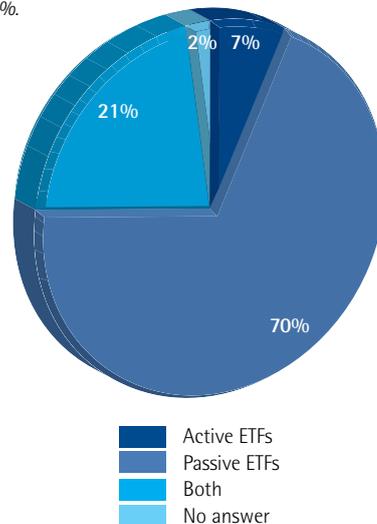
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are “not familiar with the practice” (6% and 3%, respectively) become educated about advanced forms of trading ETFs.

### 4.1.5. Replication methods for ETFs

Most ETFs are passively managed and replicate indices. More recently, actively-managed ETFs have been launched as well.<sup>26</sup> Exhibit 4.7 shows that the majority of respondents (70%) prefer passive ETFs, while active ETFs are preferred by about 7% of respondents. 21% of respondents indicate that they are indifferent between both types of ETFs.

*Exhibit 4.7: Which type of ETF do you prefer?*  
This exhibit indicates the distribution of respondents based on their preferred type of ETFs. Non-responses are reported as “no answer” so that the percentages for all categories added up to 100%.



Active ETFs fly in the face of the investment philosophy that would have the manager eschew stock picking and concentrate on asset allocation. Active ETFs allow immediate trading in actively-managed funds. Therefore, the logical application of such funds would be short-term manager selection, not asset allocation. A dilemma exists in active ETFs that may reduce their attractiveness to investors. Active ETFs are supposed to have some of the advantages of ETFs, such as transparency,

tax efficiency, and liquidity, all while being actively managed. However, since managers are paid for their stock selection, frequent disclosure of the underlying stock holdings would encourage other investors to buy the underlying securities on their own instead of trading ETFs. On the other hand, if transparency is low, the price of ETFs would suffer significant deviation from the NAV of the underlying holdings.

Many ETF providers in the U.S. have made applications to the SEC to launch actively-managed ETFs which do not disclose their holdings on a daily basis without success.<sup>27</sup> This may illustrate the conflict between the product providers' desire to keep their investment strategies private when it comes to active management and the regulators efforts to maintain the key property of transparency within ETFs.

The data clearly shows that respondents prefer passive ETFs. The total percentage of respondents who prefer active ETFs (7%) or both active and passive ETFs (21%) has stayed the same compared to the previous year.

The data shows that respondents are still overwhelmingly in favour of passive ETFs. Hence we analyse which types of passive ETFs they prefer in terms of the replication mechanism employed. Among those who favour passive ETFs or are indifferent, we ask them a general question, asking them to rate the “quality” of each of the different ETF replication mechanisms. Exhibit 4.8 shows that all three replication mechanisms are viewed positively by our respondents – there are fewer than one-quarter of respondents expressing negative views on any one of the replication mechanisms.

26 - Pimco launched the Total Return Active ETF on 1 March 2012, and by November 2012 it had become the largest actively-managed ETF with \$3.4bn in assets under management.  
27 - <http://www.indexuniverse.com/sections/features/9817-blackrock-plans-nontransparent-active-etfs.html>

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However, we can also see clearly that a large majority of respondents (67%) express a very positive view on the general quality of conventional full replication ETFs and almost nobody (1%) sees them as poor. On the other hand, there are more negative views on sampling and synthetic replications (13% and 23%, respectively), and there are fewer respondents who rate them as very good (19% and 22%, respectively).

An interesting part of our study emerges when we ask more detailed questions on the relative merits of different replication methods, and we find that respondents do not uniquely favour any of the possible replication techniques. When taking into account aspects including cost of replication, access to broad indices and tracking error considerations, full physical replication, sampling-based physical replication and synthetic replication actually receive similar ratings from respondents, as shown by the results in Exhibit 4.10. So it appears that debates about synthetic replication and, in particular, the communication on supposed advantages

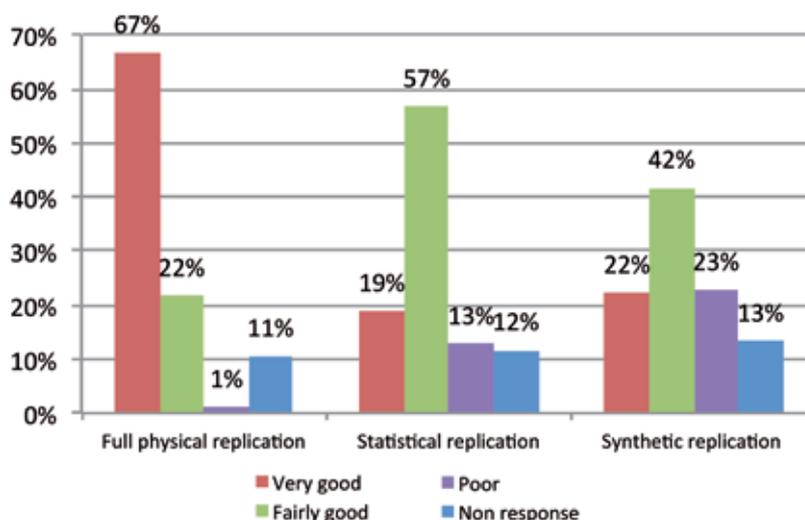
of physical replication has had an impact on respondents' overall perception as illustrated by Exhibit 4.8.

As different methods may be more or less appropriate for different asset classes or investment objectives, we developed our questions to respondents regarding their opinions on a variety of qualities for each of the three replication methods. For instance, full replication would be very suitable for indices with liquid and small numbers of constituents. However, for more broad indices or those innovative indices based on asset classes with low liquidity, full replication may not be feasible, but synthetic or sampling replication could help investors overcome this issue. As an example, one can cite the launch of the ETP on volatility indices that have been made possible by the nascent market for volatility derivatives<sup>28</sup> or ETFs that use credit derivatives to obtain credit exposure.

Exhibit 4.10 summarises the respondents' views on the various qualities of these three replication methods. Since the 2011 survey, we report the rather surprising

28 - Two exchange-traded products on S&P 500 volatility index futures were launched in January 2009.

Exhibit 4.8: How do you rate the quality of the following passive ETFs? This exhibit indicates the distribution of respondents based on their preferred replication method of ETFs. The percentages in this exhibit are for respondents who prefer passive ETFs only.



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result that synthetically-replicated ETFs scored the least strongly out of the three replication mechanisms with regard to both counterparty risk and operational risk. However, results for synthetic replication have improved over the years, especially for operational risk caused by securities lending. In the present survey we observe positive response rates of 54% and 72% for overall counterparty risk and operational risk caused by securities lending, respectively, compared to about 90% for overall counterparty risk, and about 80% for operational risk caused by securities lending, for the other two replication mechanisms. Hence, synthetic replication is still perceived to have the highest risk exposures for both counterparty risk and operational risk and full replication and sampling replication is seen to be less exposed to such risks (see Exhibit 4.9).

These results are rather surprising, particularly in terms of counterparty risk exposure, because as discussed in Amenc et al. (2011), ETFs replicated by all three methods are exposed to counterparty risks, though from different sources

(securities lending counterparty for full and sampling replications and swap counterparty for synthetic replication). Since in the event of a counterparty defaulting, collateral will be received, an ETF's level of risk exposure depends more on the characteristics of the collateral than on the type of replication.

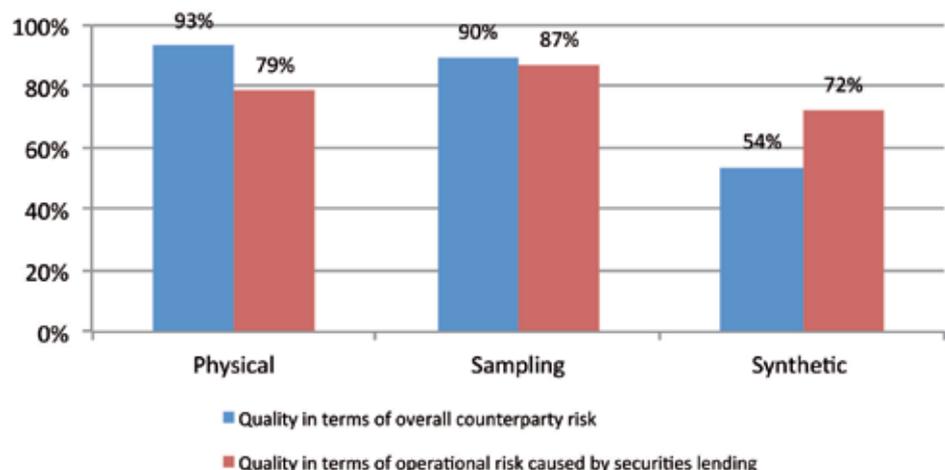
As shown in Johnson et al. (2011), synthetic ETFs, in general, do not engage in securities lending activities. Thus, it is quite surprising to observe the lowest quality score among the three types of replication for synthetic ETFs. On the other hand, full and sampling replications generally engage in securities lending.

As for the coverage,<sup>29</sup> synthetic replication is regarded as being more effective than the other two replication methods. For example, 90.3% of respondents rate the ability of synthetic replication to provide access to alternative asset classes as good or very good, compared to the ability of physical and sampling replication, which are rated as good or very good by 56.4% and 77% of respondents, respectively. Thus, full replication receives the lowest

29 - The coverage refers to capability to replicate different types of indices.

Exhibit 4.9: Comparison of Replication Methods in Terms of Perception of Counterparty and Operational Risks

Respondents were asked to score each replication mechanism with regard to quality with regard to counterparty risk and operational risk by assigning 3 to very good, 2 to fairly good, and 1 to poor. The percentages plotted on the graph show the respondents who answered very good and fairly good excluding non-responses.



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rating, for coverage, which is consistent with the explanation that it is difficult to use full replication to track large or illiquid indices.

Lastly on the reliability of replication (i.e. low tracking error), interestingly, full replication attains the highest positive response rate (98.8%), which is much higher than synthetic replication (90.5%) or statistical replication (85.9%). This is in line with the fact that the low tracking error character is often cited as a justification for full replication by ETF providers (Cheng, 2009; Kaminska, 2011; St Anne, 2011). In addition, full replication also obtains the best score for the ability to track narrow indices, with 98.6% of

respondents rating it as good or very good.

To this question, overall, the three methods receive similar scores though full replication and synthetic replication are slightly higher than the rest (2.22 and 2.14, respectively, versus 2.05 for statistical replication). However, this is a little bit inconsistent with the findings in the previous question, where statistical replication receives exceptionally high feedback, especially when compared to synthetic replication (see Exhibit 4.8). Thus there seem to be misperceptions with regard to the superiority of physically and statistically-replicated ETFs, compared to synthetically-replicated ETFs.

30 - We are showing both scores and percentages because sometimes if the answers are very extreme (e.g. half very good half poor), the score may just show an average of importance which does not properly represent the views of respondents. With the percentages shown in the results, we show a more detailed picture of respondents' answers.

Exhibit 4.10: Comparison in the Qualities of Different Replication Methods

The scores indicated in the table are obtained by assigning 3 to very good, 2 to fairly good, 1 to poor and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown in the next row indicate the percentages of respondents who answered very good and fairly good excluding non-responses.<sup>30</sup>

	Full replication	Sampling replication	Synthetic replication	Average
<b>QUALITY SCORES</b>				
<b>Reliability</b>				
Quality of reliability of replication (i.e. low tracking error)	<b>2.64</b>	1.98	2.33	2.32
	<b>98.8%</b>	85.9%	90.5%	
<b>Coverage</b>				
Ability to provide access to alternative asset classes	1.73	1.90	<b>2.37</b>	2.00
	56.4%	77.0%	<b>90.3%</b>	
Ability to track broad indices with large number (>1000) of constituents	2.23	2.31	<b>2.61</b>	2.38
	87.4%	95.9%	<b>99.3%</b>	
Ability to track narrow indices with small number (<100) of constituents	<b>2.68</b>	2.17	2.40	<b>2.42</b>
	<b>98.6%</b>	89.8%	92.4%	
<b>Cost</b>				
Cost of replication for illiquid underlying securities	<b>2.06</b>	1.99	1.94	2.00
	77.8%	<b>89.0%</b>	72.0%	
Cost of replication for a large number (>1000) of constituents	<b>2.03</b>	1.97	1.90	1.97
	82.9%	<b>81.9%</b>	68.5%	
<b>Risk</b>				
Quality in terms of overall counterparty risk	<b>2.35</b>	2.08	1.63	2.02
	<b>93.2%</b>	89.6%	53.8%	
Quality in terms of operational risk caused by securities lending	<b>2.04</b>	1.99	1.93	1.99
	78.7%	<b>87.1%</b>	72.3%	
<b>Overall Quality Scores</b>	<b>2.22</b>	2.05	2.14	

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We also show the average score received for each criterion (see the last column in Exhibit 4.10). This score shows the merits of ETFs in the eyes of our respondents with regard to each of the qualities assessed and the higher the score the better the perception of the replication mechanism with regard to the assessed qualities. On average, the ETFs score more strongly with regard to reliability in terms of low tracking error and the coverage of ETFs and least strongly with regard to the risks associated with ETFs.

### 4.1.6. Evaluating ETFs

We have seen opposite views from our respondents regarding the most favoured replicating methodology when answering a broad or a detailed question. This implies that respondents perhaps perceive some criteria as more important than others. So when they are asked a general question about preference, the most critical factor will dominate their opinions. In this section, we ask our respondents to give some insight on the important criteria when selecting an ETF and we then focus on three qualities: tracking error, liquidity and cost.

The criteria we have in the first question are pieces of information commonly found in an ETF's factsheet. As ETF providers choose to report such information, we would like to investigate whether our respondents see them as important while making investment decisions. Overall, Exhibit 4.11 shows that respondents are most concerned about the total expense ratio and the underlying index which the ETF tracks, followed by the bid/ask spread, then tracking error, UCITS compliancy, counterparty risk and ETF domicile/regulatory regime. The rest of the criteria, such as house reputation, AUM, depth of range, etc., are not as important. The

lack of importance assigned to criteria that do not have a direct impact on the characteristics of the ETF but are more closely related to "branding" is probably indicative of the increasing levels of commoditisation within the industry.

Cost is another critical factor which affects portfolio performance. It is a general quality for all types of investment, and under more pressure as the industry becomes more competitive. Whenever an investor considers a product, the cost is always an important question which may determine the choice of investment. According to Carhart (1997), the common factors in stock returns and the differences in both mutual fund expenses and transaction costs explain almost all of the persistence that is found in mutual fund returns. Hence aside from the underlying index being tracked by the ETF (which will determine exposure to common factors) the level of fund expenses is an important determinant of performance. French (2008) also illustrates the importance of cost in relation to investment performance by showing that the effect of U.S. investors switching from an active to a passive investment strategy with lower costs between 1980 and 2006, would result in an increase in average annual returns by 67 basis points. This is reflected in the high importance assigned to the total expense ratio by our survey respondents. This shows that respondents are strongly scrutinising costs within ETFs, even though they are already a comparatively low cost vehicle. This may be as a result of the recent focus that has been placed on the 'hidden costs' that are being charged to investors relating to securities lending fees by the regulators.

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The underlying index receives the second highest score (65%), with a slight decrease in importance compared to the results of the 2014 survey (68%), which implies that the selection of ETFs very much depends on the investment objectives and less so on the other qualities (aside from TER and liquidity) of an ETF. In other words, even if an ETF replicates an index perfectly and is free of risk or tracking error, as long as the underlying index is not the desired one, investors will not choose this ETF. The importance of the underlying index would seem to make perfect sense as the reason for investing is to gain a specific type of investment exposure.

The fact that investors think that the underlying index is a key factor supports the recent increased scrutiny being placed on financial indices in general and specifically those acting as benchmarks for UCITS by the European Commission and by ESMA respectively. We refer the reader to the ESMA consultation documents.<sup>31</sup>

The bid/offer spreads receive the third highest score (59%). Bid/ask spread is a measure of liquidity. Liquidity is one of

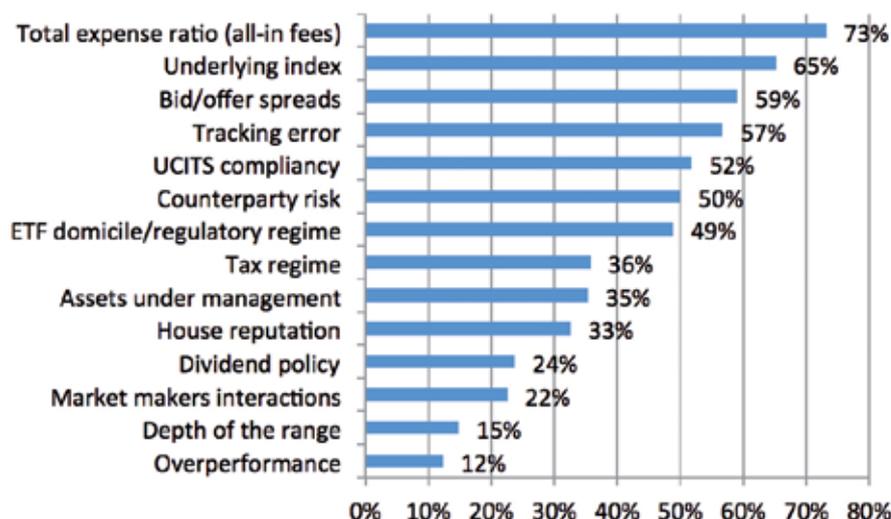
the most essential criteria to evaluate the quality of ETFs and other indexing vehicles. The most attractive advantage that ETFs bring to investors is that ETFs could be traded in the exchange market like stocks; hence ETF products are very liquid. As a result, liquidity is an important factor when evaluating an ETF.

The fourth highest score is for tracking error. The primary goal of an ETF is to track the performance of an underlying index. Thus, tracking error is a straightforward indicator for assessing the quality of an ETF.

Besides the tracking quality and the liquidity, indicated by our respondents as important qualities when comparing ETFs that replicate the same desired index, counterparty risk, which is usually linked to synthetic replication, but in fact associated with all kinds of ETFs, also draws significant attention from our respondents. ETF providers often launch parallel products on the same index with different dividend distribution policies,<sup>32</sup> however, our results show relatively low importance.

31 - [http://ec.europa.eu/internal\\_market/consultations/docs/2012/benchmarks/consultation-document\\_en.pdf](http://ec.europa.eu/internal_market/consultations/docs/2012/benchmarks/consultation-document_en.pdf)  
<http://www.esma.europa.eu/news/ESMA-publishes-ETF-guidelines-and-consults-repo-arrangements>  
 32 - See for example the dividend capitalising and dividend distributing ETFs managed by DB X Trackers both benchmarked against the Euro Stoxx 50 Index.

Exhibit 4.11: How Do You Rate the Importance of the Following Criteria When Selecting an ETF? Respondents were asked whether they find a list of criteria critical, important or not critical. The percentages shown in the exhibit indicate the percentage of respondents who answered critical excluding non-responses.



## 4. Results

A key issue with indexing instruments is liquidity. There are a number of indicators which could be used to measure the level of liquidity. In the following question, we ask our respondents on how they perceive the different measures of liquidity (see Exhibit 4.12). Overall, the results show that, as a general impression, trading ETFs is more flexible in terms of liquidity than other type of funds (84% of respondents agree with this statement). In addition, most respondents believe that many indicators are able to only partly explain ETF liquidity: 80% of respondents believe that on-exchange traded volumes partly display the current volume traded on ETFs; 78% think that the liquidity of its underlying index also determines part of an ETF's liquidity. The bid/ask spread, which is the most commonly used indicator for liquidity, only receives support from 69% of respondents. This implies that the bid/ask spread alone

is not enough to allow us to measure an ETF's liquidity, particularly considering that when the market is extremely volatile, market makers may stop providing the prices for trading.<sup>33</sup> This could also be the reason why only 66% of respondents believe that liquidity could be ensured by market makers in OTC markets. In the end, 67% of respondents agree that the AUM level could partly measure ETF liquidity.

The next question we ask our respondents is about how they assess the ETFs in terms of their costs. Overall, Exhibit 4.13 shows that the TER and the spread are the most critical factors when assessing an ETF. More than half of respondents see them as critical (70% and 52%, respectively). Creation & redemption fees and brokerage fees are less important. About 40% and 33% of respondents, respectively, consider them critical.

33 - See example on 6 May 2010, also called "flash crash". When the market has a sudden drop, many automatic trade orders are executed, causing a scarcity in market liquidity; Market makers were not able to provide instantly accurate spreads, so many of them stop providing prices (SEC report).

Exhibit 4.12: How would you Rate the Following Statements When Considering or When Assessing the Liquidity of an ETF?

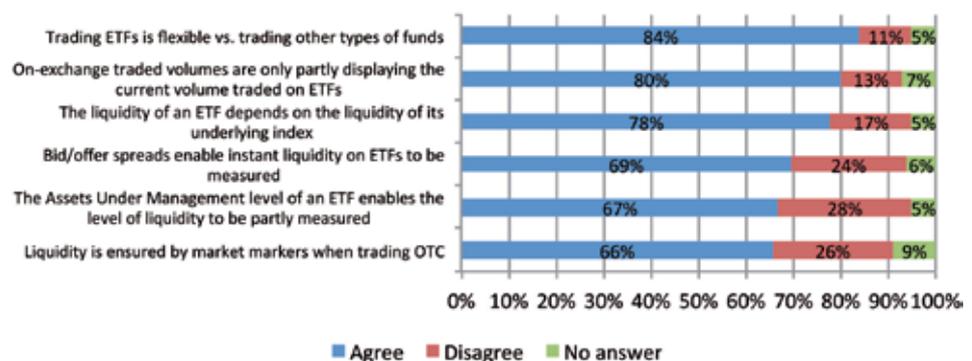
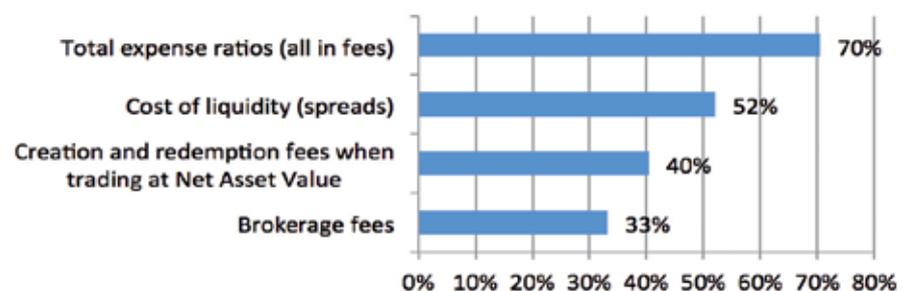


Exhibit 4.13: How Do you Rate the Importance of the Following Criteria When Selecting an ETF?

Respondents were asked whether they find a list of criteria critical, important or not critical. The percentages shown in the exhibit indicate the percentages of respondents who answered critical excluding non-responses.



## 4. Results

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The results of this question are related to how investors use ETFs. For instance, the TER, which includes management fees, is a cost that will erode the NAV of the ETF over time and is unrelated to the trading activity, as opposed to brokerage fees which in aggregate will be related to the volume of trading that takes place. From the results of this question, we would expect that our respondents are more likely to be using ETFs for long-term buy-and-hold purposes rather than short-term high frequency trading which is confirmed in Section 4.3.1 of the Results section.

### 4.1.7. Future development of ETFs

So far, our questions have focused mainly on the current usage and the current issues of ETFs. A clear advantage of our survey methodology where we have access to a sample of investment management professionals is that we can also analyse the plans for the future rather than just observe realisations. In a last set of questions in this section on ETFs we ask survey participants about their views on their use of ETFs in the future, as well as products they would like to see developed. This allows us to gain some perspective on future developments on the demand side of the ETF industry.

First, we ask those surveyed to identify the area in which they predict the greatest increase in the use of ETFs. These areas include exposure to new asset classes through ETFs, constructing optimal portfolios of ETFs, hedging and risk management with ETFs and cash equitising with ETFs. Exhibit 4.14 shows that the greatest increase (chosen by 36% of the respondents) is expected to be in the area of accessing new asset classes. It seems to justify the strategy of ETF providers to cover new asset classes such

as listed real estate, listed private equity, commodities, volatility and even more specific alternative asset class segments.

On the other hand, 34% of respondents would like to increase use for optimal portfolio construction, an increment of 1% from last year. An implication of this planned increase in using ETFs in optimal portfolio construction is that respondents see ETFs not only as purely passive tools to cover broad market segments but also want to exploit diversification benefits from optimally constructed portfolios that combine various ETFs. This may be driven by the emergence of Smart Beta products that offer exposure to a variety of alternatively weighted indices. Indeed, there is recent evidence that combining optimal portfolios constructed under different assumptions results in a higher probability of outperformance (compared to the cap-weighted index) over market cycles than any one alternatively constructed weighting scheme. Hence it would make sense that investors in ETFs would benefit from exploiting such diversification-based strategies.

For instance, Amenc et al., (2012a) show that a global minimum variance strategy does well in adverse market conditions, while Maximum Sharpe Ratio (MSR) portfolios provide greater access to the upside of equity markets. As the relative performance of these two diversification approaches depends on market conditions, they show that a combination of both approaches leads to a smoother conditional performance and higher probability of outperformance of the cap-weighted index.

The next area we examine is the use of ETFs for risk management and hedging. We can see that 12% of respondents foresee an increase in their use of ETFs in this

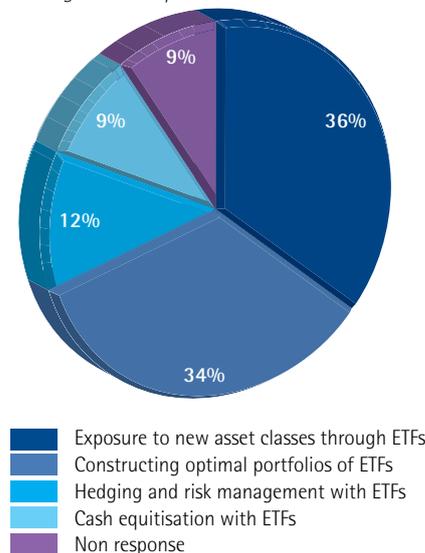
## 4. Results

area. These two uses suggest that ETFs can become a tool for portfolio management besides the basic application in accessing new asset classes. However, the percentage of respondents anticipating the use of ETFs for hedging and risk management is lower than we would expect, though higher than last year's figure of 7% given the inherent liquidity and low cost related qualities which would expect to make them ideal for dynamic hedging type strategies.

One of the reasons may be that there is limited disclosure with regard to information that is directly or indirectly related to the risk characteristics of the indices underlying the ETFs. For instance, Amenc, Goltz and Martellini (2013) have shown that there is very little disclosure of historic index constituents within a sample of 50 strategy and reference indices. The lack of this type of information prevents investors from understanding the risk characteristics of their ETFs, which would prohibit them from using ETFs effectively for the purpose of risk hedging.

*Exhibit 4.14: In Which Area Do You Predict the Greatest Future Increase in Your Use of ETFs?*

*This exhibit indicates the distribution of different areas which are predicted to have the greatest future by investors. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.*



In addition, we ask our respondents about the possible directions for future innovations of ETFs. In line with the results of Exhibit 4.7 which demonstrated that respondents expressed a clear preference for passive as opposed to active ETFs, Exhibit 4.15 shows that 77% of respondents believe that ETFs should remain beta-producing products. As ETFs are mainly used to track indices, the main objective of investing in ETFs is still to get exposure to the market (beta exposure). This is consistent with a result already evidenced in our European Indices Survey 2011 (see Amenc, Goltz and Tang, 2011) that 74% of investors think indices should not aim at generating alpha but generating a normal return, i.e. to reflect the market.

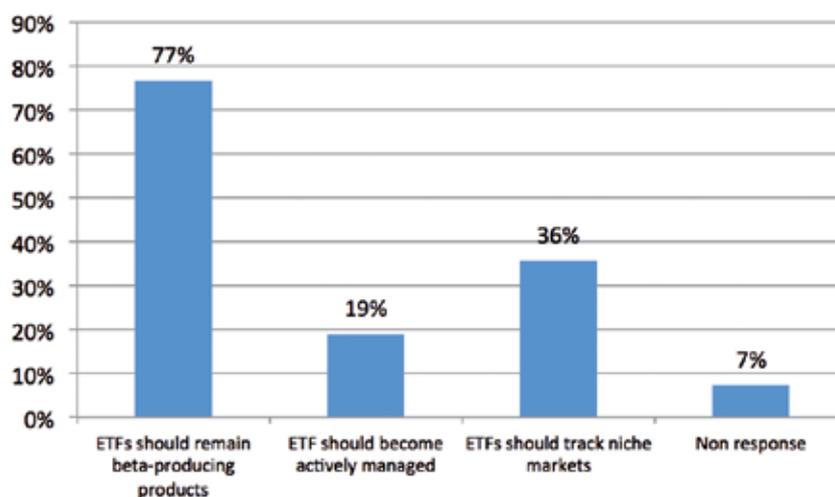
Actively-managed ETFs are indeed not as important to our respondents and only 19% think that ETFs should shift from passive to active. This percentage is quite stable through the years (16% in 2014, 18% in 2013, 17% in 2012) despite the increased interest we have seen in actively-managed ETFs elsewhere in the survey and despite a blurring of the line between what is considered an active and a passive ETF as we discuss in Section 4.1.5.

We can also see that 36% of respondents find it important for ETFs to track niche markets. In other words, innovations of ETFs should catch up with the innovations of indices. In following questions we try to define a bit more clearly the type of niche markets where investors would like to see further product development.

## 4. Results

Exhibit 4.15: Do you think...?

This exhibit indicates the distribution of different areas which are the possible directions for innovations. Respondents were given the option of selecting more than one answer hence the percentages are in excess of 100%.



Over the last 10 years the industry has become more mature and there are over one thousand products in the market (BlackRock, 2015), hence it will be very interesting to see where the gaps in the market are in terms of investor demand. Exhibit 4.16 illustrates the types of ETFs that respondents would like to see further developed in the future. Respondents were given the option of selecting more than one answer hence the percentages are in excess of 100%.

As shown in Exhibit 4.16, ETFs based on smart beta indices (38%) are the top concern of respondents. With 37% of respondents, emerging markets equity ETFs are second on the list, while ETFs based on single factor indices come in third (33%). This indicates strong interest in alternative indices. Alternative indices include those that are equally weighted or based on fundamental company characteristics (see Arnott, Hsu and Moore, 2005, or Amenc, Goltz and Le Sourd, 2009, for an introduction to such weighting schemes), or on weights derived from portfolio optimisation (see e.g. Amenc et al., 2010). This latter result is interesting as there have been a considerable number

of product launches in the area of smart beta ETFs (see Section 2.4 on smart beta ETFs in the Background section of this document). The fact that investors still see room for further product development may be explained by the fact that product launches have focused on relatively few popular strategies representing a small number of risk premia such as the value premium and defensive equity strategies. Indeed, the first generation of smart beta benchmarks were embedded solutions which did not distinguish the stock picking methodology from the weighting methodology. As such, they obliged the investor to be exposed to particular systematic risks which represented the very source of their performance (see Amenc, Goltz and Martellini, 2013). Given the increasing discussion on harnessing multiple factor premia from equity investing, including factors such as momentum, size, and quality, among others, it is perhaps not surprising that investors see room for further product development. In addition, the arrival of the Smart Beta 2.0 offers yet increased investor interest for this type of product. The Smart beta 2.0 approach enables investors to explicitly choose exposure

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Exhibit 4.16: What Type of ETF Products Would You Like to See Developed Further in the Future?

This exhibit indicates the percentage of respondents who would like to see further development in the future for different ETF products. Respondents are able to choose more than one product.

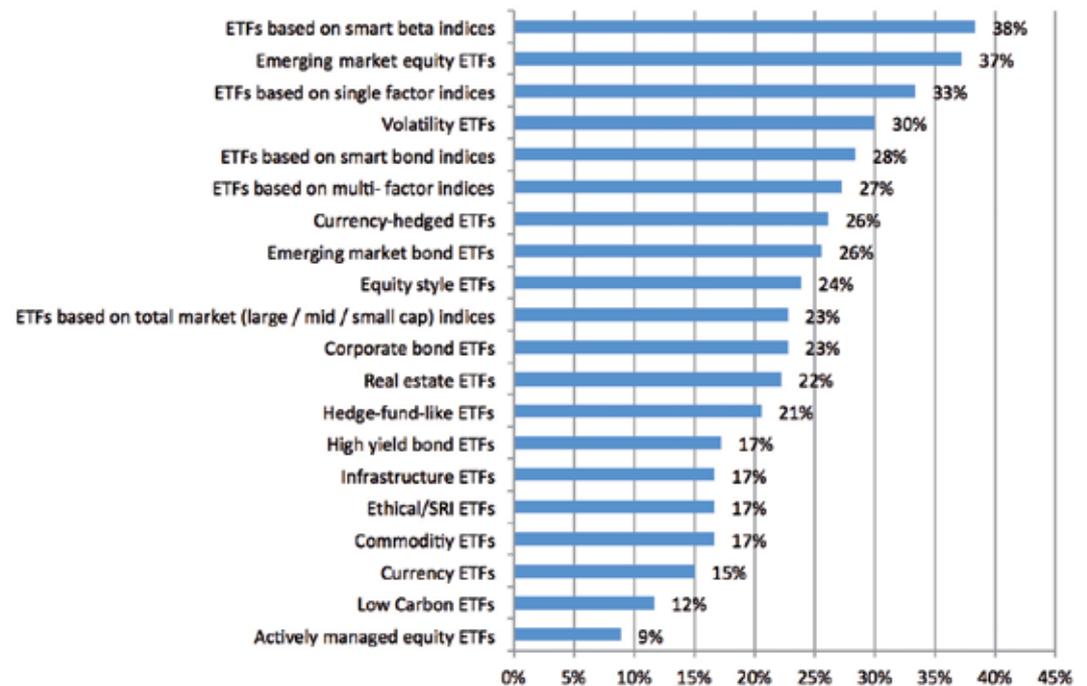


Exhibit 4.17: Largest increases in demand for product development in 2015

This exhibit shows the types of ETFs for which there were increases in terms of demand for future product development between 2014 and 2015 ranked in decreasing order of size.

What type of ETF products would you like to see developed further in the future?	2014	2015	% Increase
Volatility ETFs	22.9%	30.0%	7.1%
Hedge-fund-like ETFs	15.4%	20.6%	5.1%
Real estate ETFs	17.6%	22.2%	4.7%
ETFs based on smart bond indices	25.0%	28.3%	3.3%
ETFs based on single-factor indices	30.9%	33.3%	2.5%
ETFs based on smart beta indices	36.7%	38.3%	1.6%
Infrastructure ETFs	15.4%	16.7%	1.2%
Ethical/SRI ETFs	16.5%	16.7%	0.2%

to systematic risk factors, as well as to choose the weighting scheme of the smart beta benchmark (see Amenc, Goltz and Martellini, 2013).

Volatility ETFs, ETFs based on smart bond indices and ETFs based on multi-factor indices also rank quite highly with 30%, 28% and 27% of respondents choosing them, respectively. About a quarter of the respondents would also like to see new products developed in the areas of

currency-hedged and emerging market bond ETFs (with 26% for them both), equity style ETFs (24%), ETFs based on total market (large / mid / small cap) indices and corporate bond ETFs (23% for them both).

Compared to last year's results, there has been an increase in the demand for product development within eight categories of ETFs, namely, volatility, hedge funds, real estate, smart bond

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indices, single factor indices, smart beta indices, infrastructure and SRI (see Exhibit 4.17). The slight decrease in demand for other categories of ETFs may be the result of a satisfying development in products within these areas over the latest years.

The area of most interest to respondents in terms of product development is smart beta indices. Overall, the equity asset class gathers the highest rate of demand this year, with demand for ETFs based on emerging market equities and for ETFs based on single-factor indices ranking second and third, respectively.

### 4.1.8. Use of products that track smart beta indices

For the third year in our survey, and in view of the considerable development in new forms of indices, we asked respondents about their use of products that track smart beta indices.

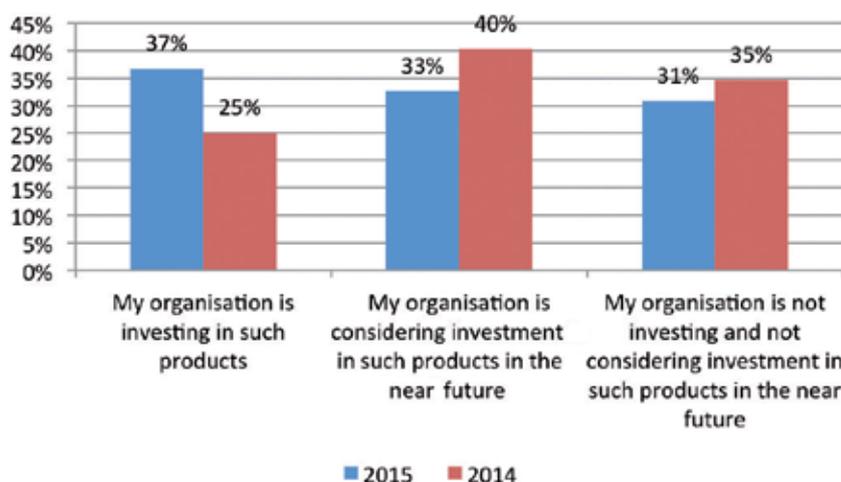
From Exhibit 4.18, we can see that more than a third of respondents (37%) already use products that track smart beta indices, and that another third (33%) are considering investing in such products in the near future. These results

show that investors already have large interest in such products. Compared to last year, we see a large increase in the share of respondents that already use products that track smart beta indices. Consequently, we observe a decrease in the percentage of respondents that consider investment in such products in the near future. However, the cumulative percentage of those that already invest or that are considering investing in smart beta in the near future is still higher in 2015 than in 2014, which gives room for further development of this investment in the near future.

Investors were then asked about their agreement with different propositions. First, they were asked, if according to them, smart beta indices provide significant potential to outperform cap-weighted indices in the long term.

From Exhibit 4.19 we can see that a vast majority of respondents agree that smart beta indices provide significant potential to outperform cap-weighted indices in the long term, as three quarters of them (75%) indicate they agree or strongly agree with this argument, a percentage

*Exhibit 4.18: Use of Products that Track Smart Beta Indices*  
 This exhibit indicates the percentages of respondents that reported using products that track smart beta indices. Non-responses are excluded.



## 4. Results

even higher than that obtained last year (71%). However, we observe a slight decrease in the percentage of respondents who strongly agree with this assertion compared to last year (12% versus 14%).

Then, respondents were asked if they think smart beta indices allow factor risk premia such as value and small-cap to be captured. From Exhibit 4.20, it appears that a vast majority of respondents (87%) agree or strongly agree that smart beta indices allow factor risk premia such as value and small-cap to be captured, compared with 82% of respondents in

2014, the increase being both observed among those respondents that agree and strongly agree with the statement.

Then, respondents were asked if they think smart beta indices allow the concentration of cap-weighted indices in very few stocks or sectors to be avoided. Here again, from Exhibit 4.21, we can see that a large share of respondents (81%) agree or strongly agree that smart beta indices allow the concentration of cap-weighted indices in very few stocks or sectors to be avoided. Rounding effects may give the illusion of a slight decrease

Exhibit 4.19: Do You Think Smart Beta Indices Provide Significant Potential to Outperform Cap-Weighted Indices in the Long Term? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded.

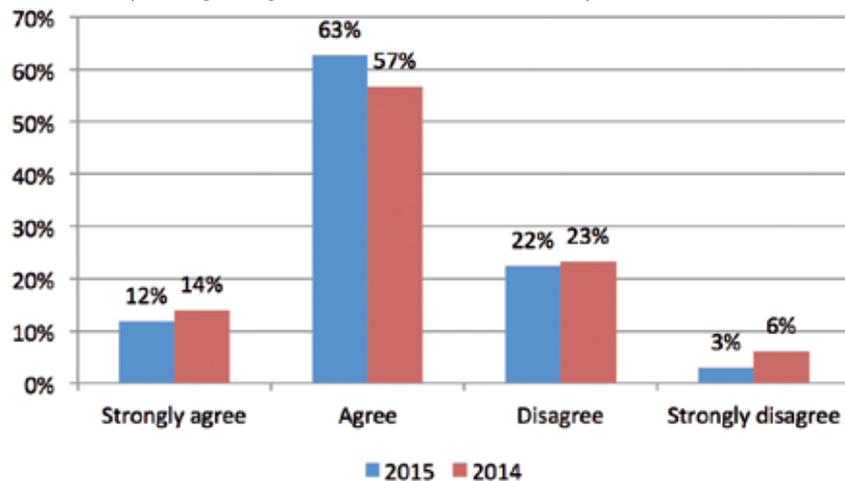
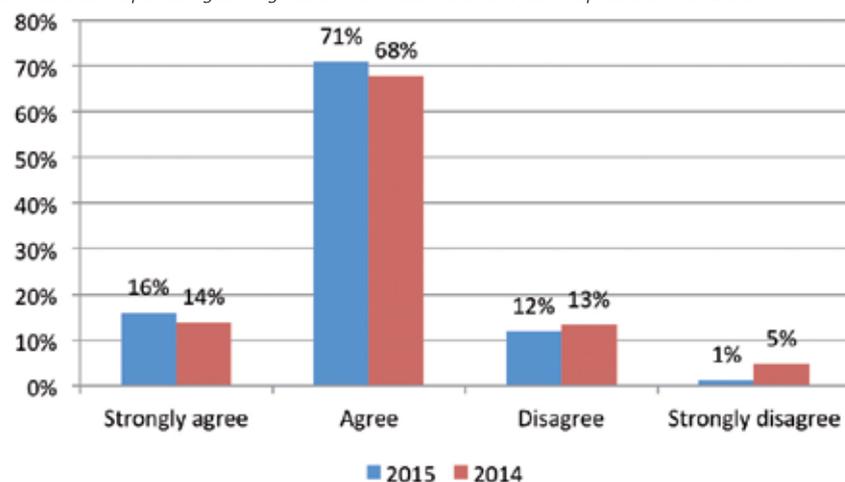


Exhibit 4.20: Do You Think Smart Beta Indices Allow Factor Risk Premia such as Value and Small-Cap to be Captured? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded.



## 4. Results

of 1% in the result compared to last year. However, if we compute the exact figures, the results are rigorously similar in 2014 and 2015 (81.25%), the only difference being that fewer respondents strongly agree compared to last year.

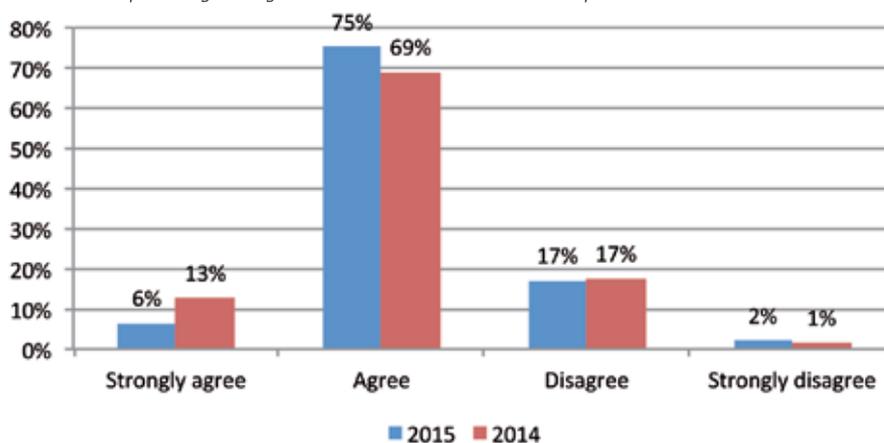
Further, respondents were asked if they think that smart beta indices require full transparency on methodology and risk analytics diversification. From Exhibit 4.22, we can see that the vast majority of respondents (94%) agree or strongly agree that smart beta requires full transparency on methodology and risk analytics, a percentage even higher than the 88% obtained in 2014. Further, almost half of them (49%) strongly agree with statement, which represents a considerable increase, compared to last year, where already more than one-third of respondents strongly agreed with the statement.

These results confirm earlier research on the need for transparency of index investors in general. In particular, in a survey conducted among European investors on their perception of index transparency, Amenc and Ducoulombier (2014) found strong conviction among

respondents that the transparency currently offered by index providers is, in general, inadequate. Moreover, their results show that the rise of strategy indices makes transparency even more important and that opacity undermines the credibility of reported track records, in particular for new forms of indices. When reviewing existing indices and their disclosure practices, Amenc and Ducoulombier (2014) find that a number of providers failed to disclose the full calculation methodology that would allow for replication of their strategy indices (e.g. formulae or procedures were not properly described or specified, proprietary or third party models were used but not provided). They also find that for smart beta indices used by UCITS, only three out of five index firms provided a full history of their index closing levels. In the Edhec-Risk Alternative Equity Beta Investing survey, Amenc et al., (2015a) find similar strong evidence on severe shortcomings of alternative equity beta strategies in terms of the transparency they offer investors. In fact, "limited information on risks" and "limited access to data" appear to be some of the biggest hurdles in terms of alternative equity beta

Exhibit 4.21: Do You Think Smart Beta Indices Allow the Concentration of Cap-Weighted Indices in Very Few Stocks or Sectors to be Avoided?

This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded.



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adoption by investors. Moreover, when asked about the importance of different assessment criteria when evaluating advanced beta offerings, respondents saw transparency as one of the key criteria.

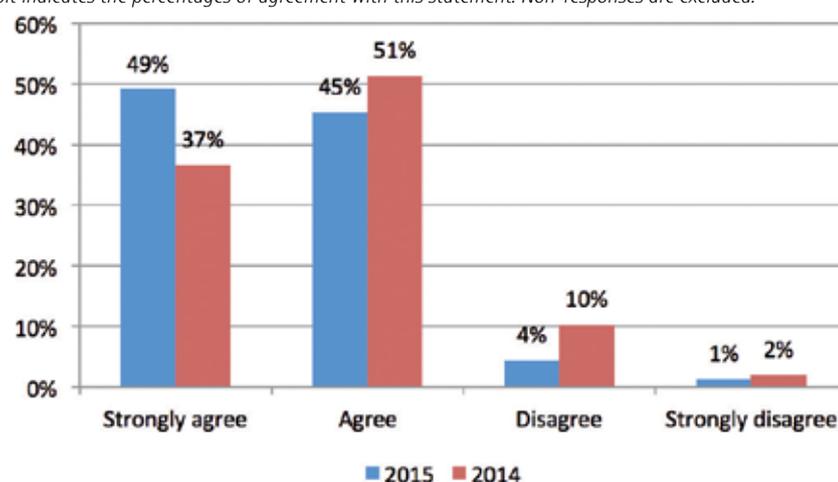
Further, respondents were asked if they think diversification across several weighting methodologies allows risk to be reduced and adds value. From Exhibit 4.23, we can see that about four out of five respondents (79%) agree or strongly agree that diversification across several weighting methodologies allows risk to be reduced and adds value. Results are remarkably similar to those obtained last year in terms of distribution between the four possible answers.

These results are in line with a rich academic background. Indeed, as demonstrated by Kan and Zhou (2007), Tu and Zhou (2011), and Amenc et al., (2012b), combining the different weighting schemes helps to diversify away unrewarded risks and parameter estimation errors. Stock-specific risk (such as management decisions, product success, etc.) is reduced through the use of a suitable diversification strategy. However, due to imperfections in the

model, residual exposures to unrewarded strategy-specific risks remain. For example, Minimum Volatility portfolios are often exposed to significant sector biases. Similarly, in spite of all the attention paid to the quality of model selection and the implementation methods for these models, the specific operational risk remains present to a certain extent. The robustness of the Maximum Sharpe Ratio scheme depends on a good estimation of the covariance matrix and expected returns. The parameter estimation errors of optimised portfolio strategies are not perfectly correlated and therefore have potential to be diversified away (Kan and Zhou, 2007; Amenc et al., 2012b). A Diversified Multi-Strategy approach,<sup>34</sup> which combines the five different weighting schemes in equal proportions, enables the non-rewarded risks associated with each of the weighting schemes to be diversified away.

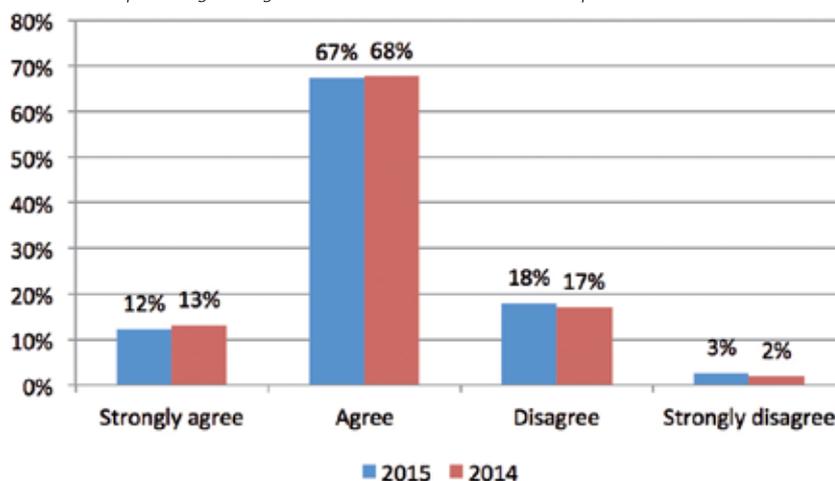
34 - Diversified Multi-Strategy weighting is an equal weighted combination of the following five weighting schemes - Maximum Deconcentration, Diversified Risk-Weighted, Maximum Decorrelation, Efficient Minimum Volatility and Efficient Maximum Sharpe Ratio (Lodh and Sivasubramanian, 2015).

Exhibit 4.22: Do you think smart beta indices require full transparency on methodology and risk analytics? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded.



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Exhibit 4.23: Do you think that diversification across several weighting methodologies allows risk to be reduced and adds value? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded.



In conclusion, respondents show great interest in products based on smart beta indices, as they see them as providing potential improvement in their investment, and this interest is still growing as shown by a comparison with the results of last year. In addition, they have major concerns about the quality of these products, as 94% of them think that smart beta indices require full transparency on methodology and risk analytics.

### 4.2. The Pros and Cons of ETFs, Futures, Total Return Swaps and Index Funds

In this section, we compare four investment instruments that allow the simple execution of trades in large baskets of stocks: ETFs, futures, TRS, and traditional index funds. Our criteria for evaluation are loosely based on Rubinstein's (1989) early examination of such instruments. We look at the advantages and disadvantages of each instrument and then emphasise specific issues concerning total return swaps, futures, and ETFs. In addition, we assess the future use of these instruments by European institutional investment managers and asset managers to highlight developing trends.

#### 4.2.1. Comparing ETFs to alternatives

We ask survey respondents whether they invest in alternatives to ETFs, such as futures, total return swaps, and index funds and ask them to rate exchange-traded funds and their alternatives according to various criteria. The responses – analysed in more detail below – allow for a few general conclusions. First, in terms of liquidity, transparency, and cost, if ETFs are considered to be advantageous products, they are a little less well regarded than futures for these criteria. Second, ETFs are ranked highest for available range of indices and asset classes. Therefore, European investors and asset managers seem to be well aware of the diversity of ETFs, which has grown dramatically in recent years. Third, futures are the most serious alternative to ETFs, but ETFs are perceived as superior with regard to minimum subscription, operational constraints, and the regulatory regime. Therefore, it appears that implementation concerns with futures (such as margin calls, and applying exact allocations even for small-sized portfolios) give ETFs an advantage. Fourth, the respondents believe that ETFs perform generally much better than total return swaps.<sup>35</sup>

35 - This belief seemingly conflicts with that expressed by Lhabitant, Mirlesse, and Chardon (2006), who concluded that indexation with derivatives provides better performance than exchange-traded funds and that, when considering both costs and tracking error, swaps are the most efficient mechanism for tracking an index. These conflicting beliefs may be explained, to some extent, by a lack of familiarity with total return swaps, as a considerable share of respondents do not answer this particular question. Even among those who do, however, total return swaps are not considered superior.

## 4. Results

Before going into detail on the comparisons, we first ask our respondents which alternatives they use for ETFs. Exhibit 4.24 shows that index funds are the most commonly used substitute for ETFs – 59% of respondents use them, closely followed by futures, with 56% of respondents using them as substitutes for ETFs. In contrast, only 23% have allocations to total return swaps. This suggests that index funds and futures are the most popular substitutes for ETFs. 15% of respondents do not use any of these alternatives at all.

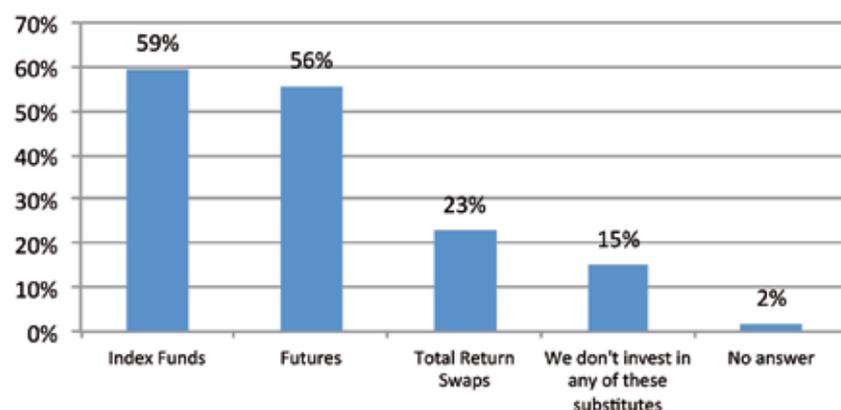
With this result in mind, we could expect that there would be a higher response rate for futures and index funds as more respondents use them, which indicates a greater familiarity rate. We summarised the finding in Exhibit 4.25. This table displays both the overall score and the percentage of respondents who answered “very good” or “fairly good” for each question (excluding non-responses). For each particular question, the score is obtained by assigning grades 1 to 3 for answers of poor to very good and calculating the average score based on the number of responses who have rated that question. The “average score” row shows the average across the 11 different evaluation criteria for each type of instrument. Now we start the discussion row by row.

As the first row on liquidity shows, 98.8% of respondents believe that futures are very good or fairly good in terms of liquidity, followed by ETFs and index funds with 95.9% and 93.9% in terms of a positive response rate, respectively. Almost no respondents state that liquidity is “poor” for these three products. By contrast, 68.8% of respondents view total return swaps, the least liquid of these instruments, as very liquid/fairly liquid. These results show that respondents appreciate the merits of futures and ETFs with regard to immediate trading, with a slight increase in the positive rate concerning future liquidity, and a slight decrease concerning ETF liquidity, compared to the previous years’ results.

Now we move to the second row on the cost of liquidity. Survey respondents express opinions on the cost of liquidity that are quite comparable to their opinions on liquidity in terms of relative rating of the three more appreciated products. Futures score the highest (96.9% judging them to be very good or fairly good), followed by ETFs (93.6%) and index funds (84.8%). The least considered product is still the same, as only 64.3% of respondents view total return swaps as very good or fairly good with regard to cost of liquidity.

Exhibit 4.24: Use of substitutes for ETFs

This exhibit indicates the percentages of respondents that reported to using different alternatives to ETFs. Respondents are able to choose more than one alternative. Non-responses are reported as “no answer” to show the response rate.



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When it comes to other costs such as fees and expenses, most respondents think that futures are still the best instrument. 95.5% judge futures to be either very good or fairly good in terms of costs. ETFs come second, with 94.7% viewing them as very good or fairly good in terms of cost, and index funds third, with 81.1% viewing them as very good or fairly good. Total return swaps perform less well in this category, with 30.2% ranking them as poor in terms of cost.

However, certain market participants argue that an increase in the costs of futures has been observed, that is to be related to banks passing their additional costs to end investors.<sup>36</sup> Indeed, due to regulatory frameworks like Basel III, banks are forced to hold capital against their sale, when they were considered before to be risk-free by many lenders. Annualised roll costs of futures may exceed total expense ratios of ETFs. As a result, ETFs that do not have rolling costs and that may be held indefinitely have appeared as valuable substitutes for investors. It can be argued that, with \$1.5 trillion invested in futures, ETFs have billions of potential gains, even if they only gain a small share of the future market.

With respect to the reliability of tracking error, all four instruments receive very high scores with positive response rates of more than 90% each. ETFs receive a slightly higher score than the rest (97.6%), followed by futures (96.8%).

It should be noted that respondents were only asked about tracking-error. The tracking quality of ETFs may be characterised by several indicators, including not only the tracking error but also the tracking difference. The tracking difference is the difference between ETF total return and the total return of the replicated index, while

the tracking error evaluates the volatility of the difference in return between an ETF and its benchmark. Bonelli (2015) shows that depending on whether we consider the level of tracking error or the level of tracking difference, the ranking of ETFs that track the same index may differ greatly. For example, considering a collection of five ETFs that track the MSCI World Index, he observes that tracking error varies significantly across the different ETFs that track the same index (from 0.02% to 0.22%). The ETF with the lowest tracking error with regard to the index has one of the highest tracking differences (-0.42%), and thus greatly underperforms its benchmark, while the ETF which has one of the highest tracking errors (0.21%) also has the lowest tracking difference (-0.19%). Similar results were obtained for two other indices, namely the MSCI Emerging Markets Index and the MSCI Europe Euro Index. Bonelli (2015) concludes that tracking error is not representative of the under or outperformance of ETFs with respect to their benchmark, but serves first of all to evaluate the relative risk of daily deviations and is more a concern for short-term investors than their mid- or long-term counterparts. Long-term investors may be more interested in tracking difference, as its level provides information about ETF costs. Indeed, if ETF replication were perfect, the tracking difference would be equal to the ETF expense ratio. Thus, the lower the tracking difference, the lower expense ratio.

When we move to the product range, ETFs clearly obtain the best rating, with 96.4% of respondents stating that the available range is very good or fairly good. This finding is consistent with recent developments in the ETF industry offering exposure to a wide range of indices (Demaine, 2002). Index funds come in second (79.9%), closely followed by futures (79.2%). Total return

36 - See Lord, R. 2014. Comment: Futures trading costs are rising. *Financial Times* (19 December) and Samuel, J. 2014. Blackrock Makes ETF Gains as Futures Costs Rise. *The Wall Street Journal* (6 November).

## 4. Results

swaps (75.8%) come in last position, not far from index funds and futures, although they have a less diversified product range. Furthermore, it should be noted that between 20% and 25% of respondents consider the product range to be poor for all three competitors to ETFs, while less than 4% do so for ETFs.

In terms of transparency, it can be seen that few respondents (3.9%) believe that futures are poor. ETFs also have a low percentage of 5.4% who rank transparency as poor. These figures have slightly decreased for futures and slightly increased for ETFS when compared to the 2014 survey (6.2% and 4.6%, respectively). Total return swaps are considered poor with regard to transparency by 35% of respondents.

ETFs are clearly the preferred instrument when it comes to the minimum subscription requirement. 98.8% of respondents consider ETFs as very good or fairly good, while only 1.2% consider them as poor. Index funds are also considered very good or fairly good by 93.0% of respondents with regard to the minimum subscription requirement. Futures follow, with about 87.0% of respondents thinking they are good. The highest percentage of respondents (45.2%) to express the greatest degree of dissatisfaction (poor) with the minimum subscription was with regard to total return swaps.

Next, ETFs are viewed as less susceptible to operational constraints than the other three instruments. Indeed, 95.2% of our respondents believe that ETFs are very good or fairly good in terms of such constraints. Traditional index funds and futures are ranked behind ETFs, with 92.3% and 83.8% of respondents seeing them as very good or fairly good, respectively. Hence, in this discipline index funds are again

preferred to futures. Total return swaps are clearly perceived as the instrument most susceptible to operational constraints, with more than half of respondents (52.4%) viewing them as poor. Hence, the answer to this question confirms a pronounced difference between exchange-traded (futures) and OTC derivatives (swaps).

When it comes to the regulatory regime, respondents prefer ETFS to index funds, 98.2% versus 94.2% of respondents seeing them as very good to fairly good, closely followed by futures with 91.7% of respondents seeing them as very good or fairly good. Thus, the lowest percentage of respondents that regard these three instruments as very good or fairly good in terms of regulatory regime is higher than 90%. On the contrary, only 62.5% of respondents view total return swaps positively. But different figures are observed in terms of tax regime. Though index funds, futures, and ETFs are highly regarded still (94.9%, 92.1% and 91.9%, respectively), only 18.4% of respondents see total return swaps as poor.

Lastly, on control of counterparty risk, futures and index funds are viewed as very good or fairly good by 94.6% and 92.9% of respondents, while a lower percentage of respondents (84.8%) thought the same about ETFs. Total return swaps are the worst performers with 39.7% of respondents viewing them poorly. On one hand, this finding is expected as ETFs are highly-regulated in Europe by the UCITS rule,<sup>37</sup> which is not applicable to total return swaps. On the other hand, the finding is also a little surprising as counterparty risk which is due to the securities lending activities could also be found in index funds.

37 - [http://europa.eu/legislation\\_summaries/internal\\_market/single\\_market\\_services/financial\\_services\\_banking/mi0037\\_en.htm](http://europa.eu/legislation_summaries/internal_market/single_market_services/financial_services_banking/mi0037_en.htm)

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Exhibit 4.25: Summary of the scores for ETFs, futures, total return swaps (TRS) and index funds

This table indicates the average scores which the four products received from respondents based on the eleven criteria. For each particular quality, grades of 1 to 3 were given for answers of poor to very good and the average score was calculated based on the number of respondents who rated that question. The percentages indicate the respondents who answered "very good" or "fairly good" for each question, excluding non-responses. The numbers highlighted in bold indicate the highest score.

	ETFs	Futures	TRS	Index Funds
<b>QUALITY</b>				
Liquidity	2.43 (95.9%)	<b>2.81</b> (98.8%)	1.78 (68.8%)	2.30 (93.9%)
Cost of liquidity	2.23 (93.6%)	<b>2.66</b> (96.9%)	1.71 (64.3%)	2.11 (84.8%)
Other cost	2.35 (94.7%)	<b>2.62</b> (95.5%)	1.80 (69.8%)	2.11 (81.1%)
Tracking error	2.39 (97.6%)	<b>2.61</b> (96.8%)	2.40 (93.6%)	2.28 (90.3%)
Product range	<b>2.66</b> (96.4%)	2.03 (79.2%)	2.00 (75.8%)	2.01 (79.9%)
Transparency	2.40 (94.6%)	<b>2.70</b> (96.1%)	1.80 (65.0%)	2.27 (91.6%)
Minimum subscription	<b>2.78</b> (98.8%)	2.21 (87.0%)	1.63 (54.8%)	2.34 (93.0%)
Operational constraints	<b>2.59</b> (95.2%)	2.22 (83.8%)	1.53 (47.6%)	2.32 (92.3%)
Regulatory regime	<b>2.48</b> (98.2%)	2.38 (91.7%)	1.69 (62.5%)	2.41 (94.2%)
Tax regime	2.21 (91.9%)	<b>2.34</b> (92.1%)	2.00 (81.6%)	2.24 (94.9%)
Control of counterparty risk	2.15 (84.8%)	<b>2.52</b> (94.6%)	1.65 (60.3%)	2.35 (92.9%)
<b>Average score</b>	2.42	<b>2.46</b>	1.82	2.25

Overall, we find that futures and ETFs receive the highest scores among the four products (2.46 and 2.42, respectively), while total return swaps receive the lowest score of 1.82, which is even below the fairly good level of 2. For individual criteria, futures show very good quality in terms of liquidity, cost, tracking error, transparency, tax regime and control of counterparty risk and are the strongest competitor to ETFs. ETFs are rated as outstanding in terms of ease of use (minimum subscription, operational constraints and regulatory regime) and range of products. Interestingly, ETFs also dominate traditional index funds, as overall index funds receive a score of 2.25 as compared to 2.42 for ETFs. Total return swaps receive the second highest rating among the four products for tracking error

(2.40) and a score of 2.00 for product range comparable to those of futures (2.03) and index funds (2.01). However, the product has received the lowest rating among the four index-tracking vehicles on all the rest of the criteria. The ratings suggest that TRS are particularly poor in the sense that they are less liquid, more costly and difficult to use compared to the three other types of products.

### 4.2.2. Looking ahead

Finally, we venture a glimpse into the future by asking survey participants about their views on their use of ETF and other financial instruments in the future. In Section 4.1.7, we have already established some plans for future use of ETFs and priorities for new product development. In this section of

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the survey, we ask respondents to comment on how they plan to develop the future use of all four indexing vehicles. As a complement to the evaluation of these instruments on the various quality criteria above, this question allows us to assess the likely development of the market share of such instruments in the future.

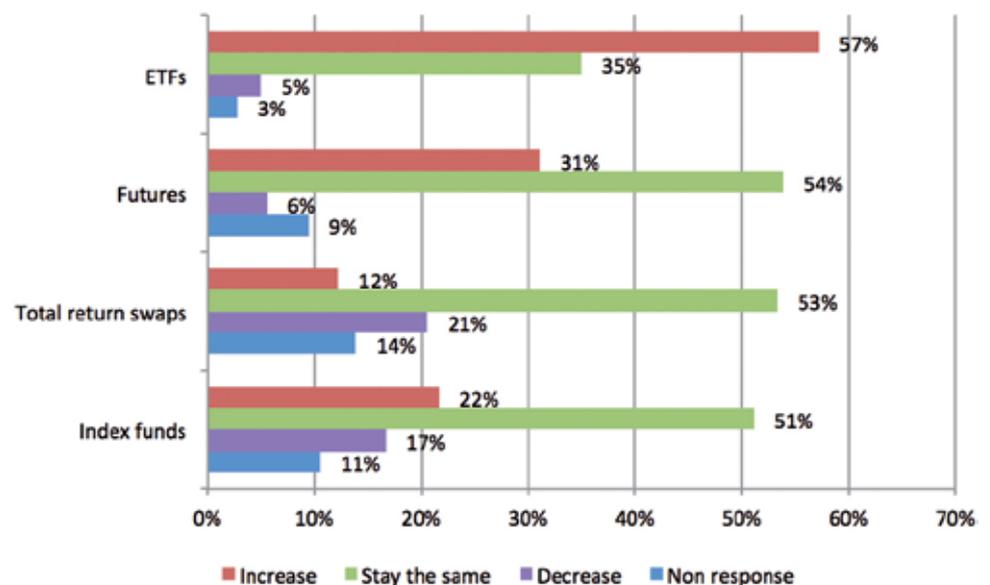
From Exhibit 4.26 we can see that a vast majority of respondents report that they expect to increase their use of ETFs, futures and index funds over time or at least that their investment in those products will stay the same. By adding the percentage of respondents answering "Increase" or "stay the same", we have 92% for ETFs, 85% for futures and 73% for index fund. This positive outlook is especially striking for ETFs. 57% of respondents plan to increase their use of ETFs, while only 5% plan to decrease it. Less than one-third of respondents (31%) plan to increase their use of futures, while 22% of respondents plan to do it with index funds. Only 6% plan to reduce the use in futures while 17% plan to decrease in index funds. Against the backdrop that this survey

only covers respondents that are already ETF investors, this increase in expected usage is even more remarkable.

In contrast, total return swaps are likely to play a minor role in the future: more asset managers expect to employ these financial instruments less in the future compared to those who predict an increase in their use. Only 12% plan to increase their use of total return swaps, but 21% plan to decrease, those figures being comparable to those obtained in 2014. Overall, it seems that the anticipated growth in ETF use will come at the expense of other indexing vehicles, such as total return swaps.

*Exhibit 4.26: How Do You Predict Your Future Use of the Following Instruments?*

*This exhibit indicates the respondents' forecast about the future use of each of the mentioned products. Non-responses to this question are reported as "no answer" so that the percentages for all categories in each product add up to 100%.*



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### 4.3. The Role of ETFs in the Asset Allocation Process

As ETFs offer investors attractive benefits like liquidity, cost efficiency and product variety, they have become an important instrument for asset allocation strategies. In this section we analyse the purpose of ETF investments. In fact, one of the unique benefits of conducting a survey of ETF users is that we not only get information on the frequency and intensity of usage, but we are also able to inquire about the purposes for which ETFs are used and how their role in asset allocation is perceived.

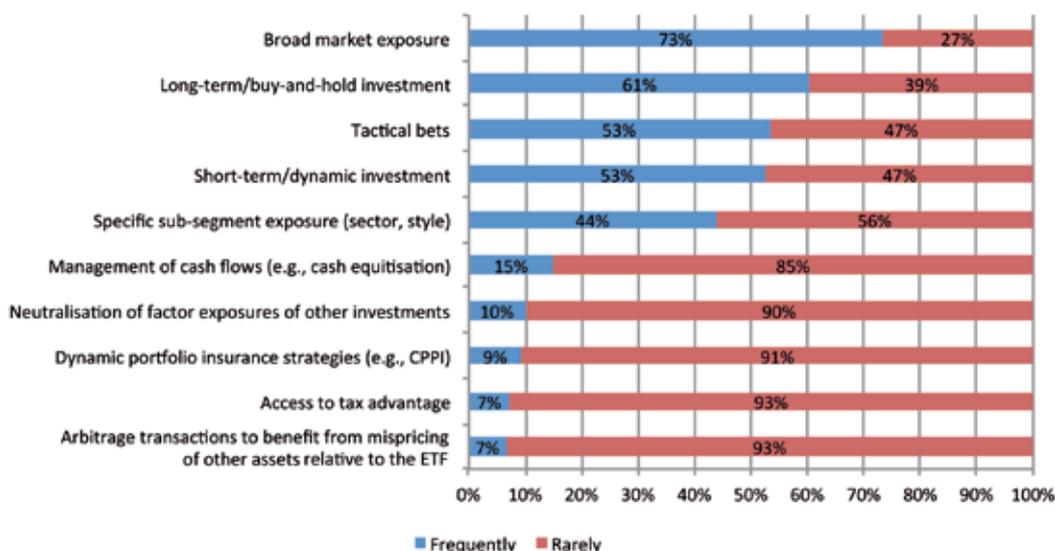
#### 4.3.1. Purpose of ETF investments

We begin the analysis with the investors' rationales behind their use of ETF products. Investment in ETFs may be more of long-term or short-term nature. Also, when using ETFs, investors may aim to gain broad market exposure or, alternatively, to gain access to specific segments of the market through ETFs on sectors or styles. Beyond such broad categorisation of use, we also assess how often ETFs are used for specific purposes such as neutralising

factor exposures or arbitraging related assets. More specifically, we ask how often the survey participants employ ETFs for different investment purposes on a scale from never (score 0) to always (score 6 on the scale). Exhibit 4.27 shows the answers by classifying all respondents into two groups: If respondents rated their usage to be 3 or less, we group them into rare users, otherwise into frequent users.

The results show that 73% of respondents use ETFs frequently for achieving broad market exposure. 61% of respondents use ETFs for buy-and-hold investments, more than half of respondents use them for tactical bets or for short-term (dynamic) investments (53% for them both), while 44% of respondents use ETFs to obtain specific sub-segment exposure. ETFs are more rarely used for management of cash flows (15%), neutralisation of factor exposures related to other investments (10%), dynamic portfolio insurance strategies (9%), tax advantages (7%) or capturing arbitrage opportunities (7%).

*Exhibit 4.27: How Often Do You Use ETFs for the Following Purposes?*  
 This exhibit indicates the frequency of respondents using ETFs for each of the mentioned purposes. Respondents were asked to rate the frequency from 1 to 6. The "frequent" category would include ratings from 4 to 6 and "Rarely" would take into account ratings from 1 to 3 and non-responses.



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These results show that investment in ETFs is mainly associated with a long-term exposure to broad market indices. Still, frequent use of more than 50% for tactical bets or for short-term exposure, as well as 44% for market sub-segments exposure in this year's findings indicates that other investment purposes are important as well. This is not a surprising result given that the liquidity, low cost and product variety benefits of ETFs should make them viable tools for such purposes.

### 4.4. The Importance of Factors as Performance Drivers

The last group of questions in the survey, introduced last year, was related to the factors inherent in equity strategies and how these factors explained the performance of these strategies.

Respondents were asked to indicate which factors were liable to be positively rewarded over the next ten years, both in general and after accounting for transaction costs and other implementation hurdles. The factors proposed were those for which the existence of a premium was largely documented in the literature since long or for which products

are commonly used. Results are displayed in Exhibit 4.28. It appears that none of the eight factors proposed to respondents obtained a poor score. On a scale from 0 (no confidence that the factor will be rewarded) to 5 (high confidence that the factor will be rewarded), the average scores, before accounting for transaction costs and other implementation hurdles, range from 2.90 (investment factor) to 3.31 (value factor). While the value factor is considered by respondents as the most likely to be rewarded, low volatility, small cap, dividend yield, profitability and momentum also obtain quite comparable high scores.

If we exclude the investment factor, we also note that only a very little share of respondents declare being unfamiliar with the factors proposed, as their percentage is lower or equal to 5% for all of them – the dividend yield and small cap factors being the ones respondents are most familiar with and the liquidity and profitability factors the ones respondents are least familiar with. These percentages of unfamiliarity are also slightly lower than the percentages obtained last year, which shows that the knowledge of these risk factors is still improving. The

*Exhibit 4.28: Rewarded Factors*

*Which equity risk factors do you think will be rewarded positively over the next ten years, after accounting for transaction costs and other implementation hurdles? The level of confidence was rated from 0 (no confidence) to 5 (high confidence).*

Factors	Confidence level that factor will be rewarded	Confidence level that factor will be rewarded after accounting for transaction costs and other implementation hurdles	Spread between the two levels of confidence	Not familiar with this factor
Value	3.31	3.00	0.31	3.33%
Low Volatility	3.24	2.83	0.41	3.89%
Small Cap	3.19	2.93	0.26	2.78%
Dividend Yield	3.17	2.92	0.26	2.22%
Profitability	3.13	2.86	0.28	5.00%
Momentum	3.13	2.66	0.47	3.33%
Liquidity	3.01	2.54	0.46	5.00%
Investment	2.90	2.71	0.19	19.44%

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investment factor was added to the list of factors for the first time this year. With about one-fifth of respondents declaring themselves to be unfamiliar with it, the investment factor is somewhat adrift of the other factors. Unsurprisingly, it is also the one which obtains the lowest rate of confidence of it being rewarded. However, after accounting for transaction costs and other implementation hurdles, the confidence level that this factor will be rewarded becomes slightly higher than those of the momentum and liquidity factors. In addition, the investment factor is also the one for which we obtain the lowest response rate in terms of the confidence level, with only 55% of respondents providing answers, compared with about 80% of respondents giving their opinion for all the other factors. This is coherent with a higher number of respondents being unfamiliar with the investment factor, compared to other factors.

Looking at the difference between the level of confidence that the factor will be rewarded and the same metric after accounting for transaction costs and other implementation hurdles (see the third column of Exhibit 4.28), may shed some light on how investors perceive the ease of implementation and the costs of the strategies based on the various factors. The highest difference between the two scores is observed for the momentum and liquidity factors (0.47 and 0.46, respectively).

The momentum strategy has been documented in the literature as being subject to data-mining, high turnover, causing trading costs that limit the profitability of the strategy, as well as being subject to the risk of reversion effect, which may be difficult to predict and manage (see Bender et al., 2013). In addition, the literature suggests that the short side of the

strategy is more profitable than the long side (Hong, Lim, and Stein, 2000), rendering this strategy less suitable for long-only investors. Concerning the liquidity factor, the least liquid stocks are those that provide the highest premium, but also the ones it is more difficult to invest in, which can make the strategy less easy to implement.

Respondents were more specifically asked about their requirements to consider the selection of a given set of factors in their investment approach. They were proposed to rate a list of factor characteristics from 0, if the assertion was not important, to 5, if it was absolutely crucial. Results are displayed in Exhibit 4.29. It appears that all the proposed characteristics receive quite high scores, ranging from 2.68 to 3.73. However, respondents are primarily concerned with the existence of a rational risk premium with a score of 3.73, closely followed by the existence of extensive empirical literature documented these premia, as well as by ease of implementation and low turnover and transaction costs, with a score of 3.63 for them both. The least important requirement for them is that factors be related to macroeconomic variables, with a score of 2.68.

From the results it appears that the existence of a rational explanation for factor risk premia is of principal importance to investors. This is probably related to the fact that a rational explanation suggests that the premium will be persistent. Indeed, if the literature interprets the factor premia as compensation for risk, the existence of the factor premia could also be explained by investors making systematic errors due to behavioural biases such as over- or under-reactions to news on a stock. However, whether such behavioural biases can persistently affect asset prices in the presence of some smart investors

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who do not suffer from these biases is a point of contention. In fact, even if the average investor makes systematic errors due to behavioural biases, it could still be possible that some rational investors who are not subject to such biases exploit any small opportunity resulting from the irrationality of the average investor. The trading activity of such smart investors may then make the return opportunities disappear. Therefore, behavioural explanations of persistent factor premia often introduce so-called "limits to arbitrage", which prevent smart investors from fully exploiting the opportunities arising from the irrational behaviour of other investors. The most commonly mentioned limits to arbitrage are short-sale constraints and funding-liquidity constraints. The main economic explanations for the value, momentum, low volatility and small cap factors are detailed in Amenc et al. (2014), and those of high profitability and investment feature in Amenc et al. (2015).

Finally, we asked respondents about the information they consider important to assess smart beta. At the same time, respondents were asked whether they considered this information easily available. It is thus interesting to see the spread between the importance of and the accessibility to this information. It appears that the highest spread is observed for information respondents considered as

crucial. For example, information about transparency on portfolio holdings over a back-test period and data mining risk are two crucial pieces of information for respondents, with a score of 4.03 and 3.81, respectively. It is also the information that appears to be the most difficult to obtain for respondents, with a score of 2.16 and 2.07, respectively. Even relatively basic information such as the index construction methodology is not judged to be easily available (score of 3.07) relative to its importance (score of 4.28). On the contrary, information about recent performance and risk over the past ten years is among the least important for respondents with a score of 3.35, but it is also the most easily available, exhibiting the highest score (3.16) across the board in terms of availability. The gap between information importance and its accessibility as seen by investors is displayed in Exhibit 4.31.

*Exhibit 4.29: Requirements about Factors*

*Which requirements do you have in order to consider a given set of factors in your investment approach from 0 (not important) to 5 (absolutely crucial)?*

Requirements	Score
Factor premium should be related to a rational risk premium, i.e. explained by a substantial risk that the factor pays off badly in bad times	3.73
Factor premium should be documented in extensive empirical literature	3.63
Factors should be easy to implement with low turnover and transaction costs	3.63
Factors should be related to firm fundamentals	3.03
Factor premium has been explained as an "anomaly" allowing rational agents to profit from irrationality of others	3.02
Factors should be related to macroeconomic variables	2.68

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Exhibit 4.30: Information about Beta Products

Which information do you consider important for assessing smart beta products on a scale from 0 (not important) to 5 (crucial) and which information do you consider to be easily available on a scale from 0 (difficult to obtain) to 5 (easy to obtain)?

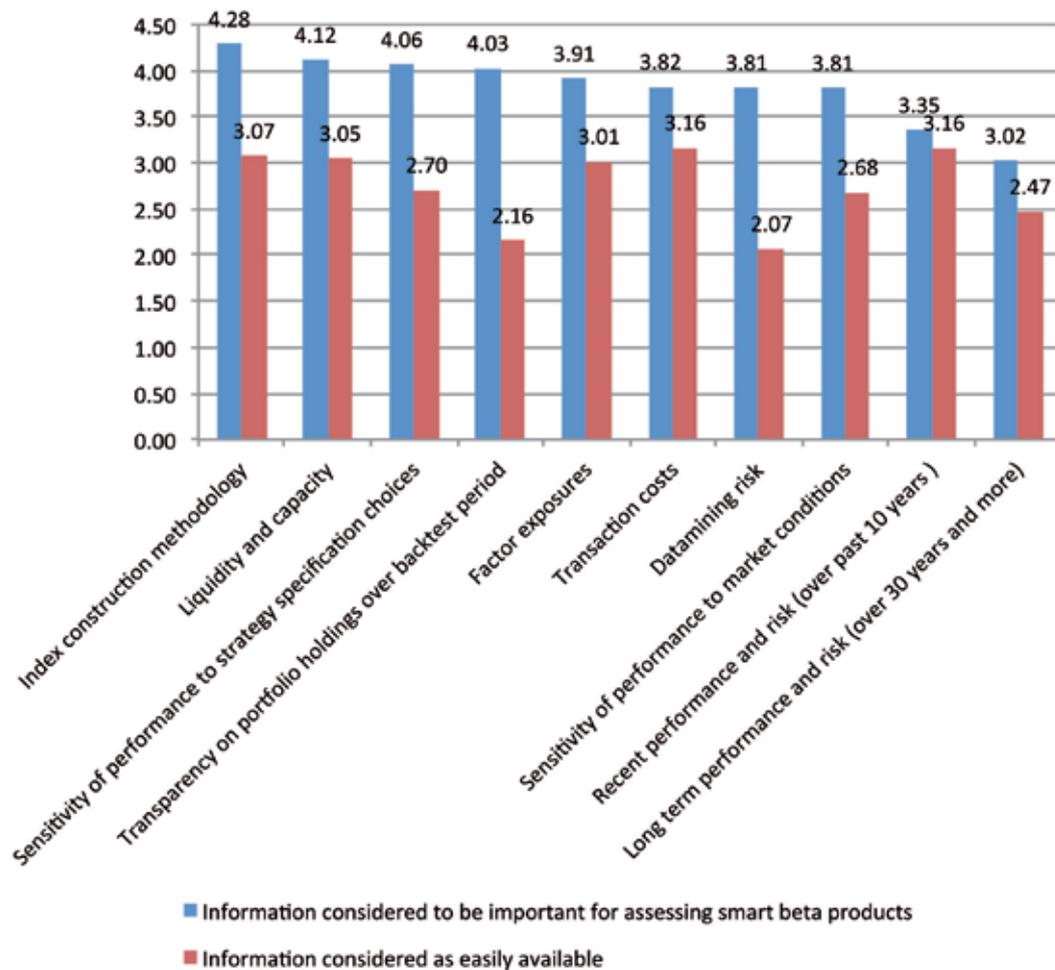
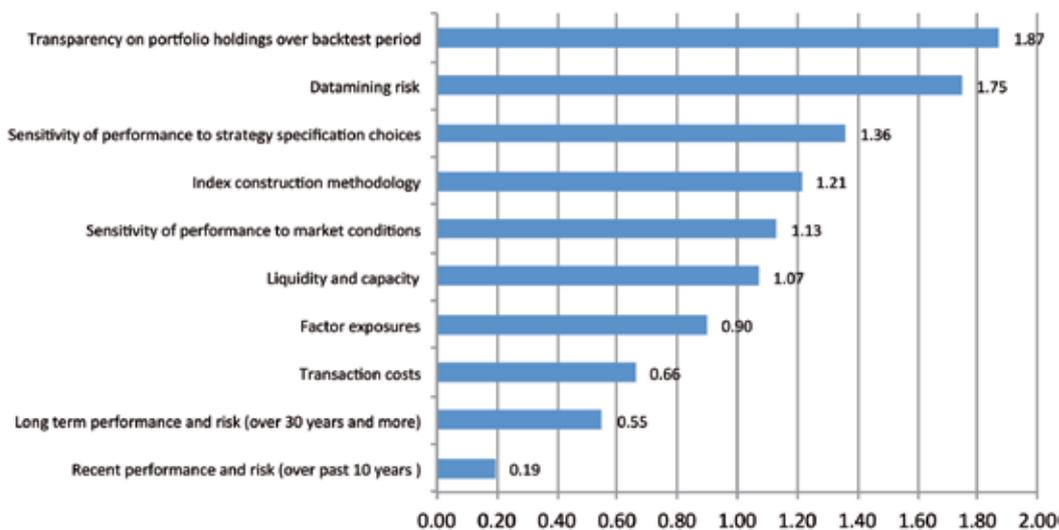


Exhibit 4.31: Gap Between Information Importance and its Accessibility According to Investors



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The fact that information that is regarded as important is not considered to be easily available clearly calls into question the information provision practices of smart beta providers. In fact, the only area in which no pronounced gap exists between the importance and the ease of accessibility scores is for performance numbers. Performance and risk information is judged to be moderately easily available and moderately important. All other areas show pronounced gaps between these two metrics. The two items that are judged to be the least easily available are holdings over the back-test period and data-mining risks. Interestingly, both these items rank much higher on the importance score for investors than, for example, past performance. Moreover, there is a pronounced gap of 1.07 between importance of information items and their ease of accessibility, as shown by the means of their respective scores (3.82 and 2.75, respectively). Overall, these results suggest that investors do not believe that information considered important for assessing smart beta strategies is made available to them with sufficient ease.

### 4.5. Trends: Use and Satisfaction of ETFs over Time

Over the past decade, investment in ETFs has increased significantly, as already shown in Section 2.1. However, since ETFs are still a rather new class of financial products, all benefits and possible uses are not yet fully known to all potential investors. Hence, not only is the investment in standard ETFs growing, but also more advanced products and sophisticated ways of using them. In this section, we compare the results of the ETF Survey 2015 with the answers we obtained in previous studies taken in 2006, 2008 to 2014. This comparison will shed some light on how the current state of

ETF usage compares to past years and will provide some insight into the evolution of ETF usage to today.

#### 4.5.1. Use and satisfaction

When comparing the usage of ETFs and ETF-like products over time, we observe a sign of increasing propagation of their adoption over the past decade. The usage of ETFs and ETF-like products in Exhibit 4.32 refers to the number of respondents who use ETFs among all respondents who invest in a particular asset class. In other words, it is the frequency of the usage. Since 2006, the increase of the percentage of respondents using ETFs in traditional asset classes has been spectacular. In 2006, there were 45% of respondents using ETFs to invest in equities, compared with 91% in 2015. As for governments and corporate bonds, we went from 13% and 6%, respectively, in 2006, to 60% and 64%, respectively, in 2015. A dramatic increase from 15% of respondents in 2006 to 82% in 2015 was also observed for commodities, while the share of respondents using ETFs to invest in real estate evolved from 6% in 2006 to 44% in 2015.

We observe a large increase in the use of ETFs for investing in bond asset classes between 2014 and 2015, for both government and corporate bonds. In 2014, 48% and 53% of respondents used ETFs to invest in government and corporate bonds, respectively, compared with 60% and 64% of respondents in 2015. This increased ETF use is likely related to the high level of satisfaction observed over several years, with government bonds enjoying a satisfaction rate of around 90% since 2012, and corporate bonds enjoying a satisfaction rate ranging from 80% to 90% since 2011 (see Exhibit 4.34). A large increase in the use of ETFs for investing in commodities was also observed between

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2014 (71% of respondents) and 2015 (82% of respondents). The equity class showed quite a stable rate in the use of ETFs for some years. Other asset classes, such as real estate or infrastructure, exhibit a rate of use comparable to that of last year, after several years of large variation from one year to another. The hedge fund class exhibits a decrease in the use of ETFs compared to 2014 (16% of respondents in 2015, versus 19% in 2014). However, this decrease is very small compared to the one encountered between 2013 (where the rate of use was 42%) and 2014, which might suggest that this rate of use also tends to become more stable for this asset class. It appears that, with the exception of hedge funds and infrastructure, all rates of use are quite high. It should be noted that, in Exhibit 4.32, we only present the asset classes for which we have data since at least 2009. Other asset classes – including volatilities, sectors, SRI, Money market funds, currencies and smart beta – were introduced into our survey more recently.

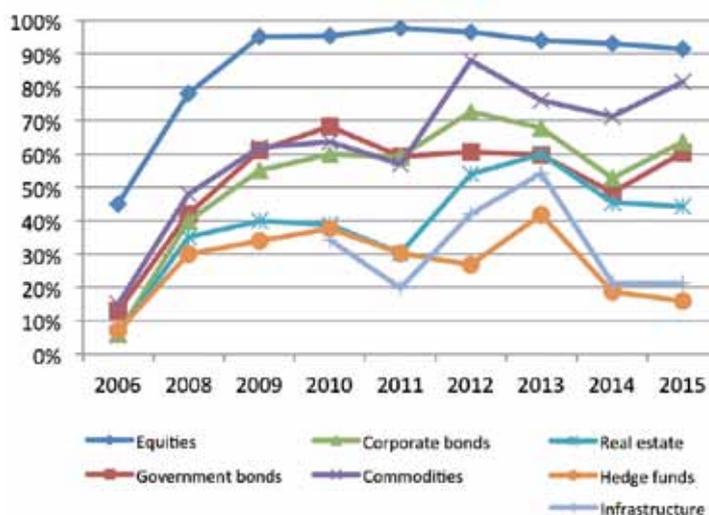
Exhibit 4.33 compares the fraction of our respondents' portfolios that is invested in ETFs.<sup>38</sup> Hence, in Exhibit 4.33, the usage

of ETFs or ETF-like products refers to the density of usage in each asset class. While the equity asset class is the one most widely used for ETF investment by investors, it is currently not the asset class with the highest proportion or density of ETF investment. In 2008, 22% of the investment in the equity asset class was made using ETFs, compared to 30% in 2015. As for government and corporate bonds, the increase in the proportion of ETF investment is more spectacular, having respectively accounted for 10% and 7% of total investment in 2008, compared to 27% and 31% in 2015. The increase in the use of ETFs to invest in commodities and real estate has also been particularly significant during this period, with the former having 16% of total investment accounted for by ETFs in 2008, compared to 45% in 2015; as for real estate, in 2008 it had 7% of total investment accounted for by ETFs, compared to 37% in 2015.

In 2015, we observe that six out of seven asset classes have noted a gain in their ETF market share, compared to the previous year. This gain is slight for equities, government bonds and infrastructure (1% for each of

38 - Since this question was not asked in the EDHEC European ETF Survey 2006, we can only provide a comparison with answers from 2008 to 2015.

Exhibit 4.32: Use of ETFs or ETF-like Products Over Time  
 This exhibit indicates the use of ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.



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them) as well as for commodities (3%), which suggests that users have reached a satisfactory level of ETF usage for these asset classes and are not looking to expand their use beyond this level. On the other hand, this gain is quite high for corporate bonds (10%) and real estate (11%), for which significant decreases had been observed the previous year (-6% and -14%, respectively). Meanwhile, hedge funds have experienced a 3% decrease in their ETF market share, after having seen a slight increase of 1% the previous year.

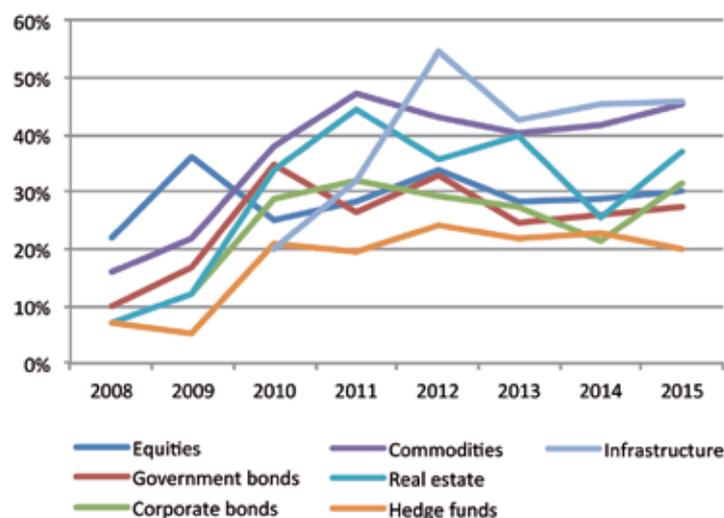
Satisfaction with standard ETFs has generally remained at high levels as shown in Exhibit 4.34. Compared to 2014, there has been increase in satisfaction with equity ETFs (7% of increase), which now reach a satisfaction rate of 98%. The stable and high rate of equity ETF satisfaction, which has consistently been in the region of 90% since our first survey in 2006, may be due to the greater consensus for equity indices. Equity indices have the longest history of development and the most number of innovations, as do equity ETFs. Investors are therefore more familiar with equity indices as well as their drawbacks. Given

the large variety of alternative weighting schemes for equity indices, investors have a wide range of products to invest in. The rate of satisfaction for infrastructure ETFs has remained stable since last year at the high rate of 86%. Some asset classes among those with the highest rates of satisfaction in terms of ETF use have encountered moderate decreases in their satisfaction rates; these include corporate bonds (9% decrease), government bonds (5% decrease), and real estate (4% decrease). However, their rates of satisfaction remain higher than 80% (81%, 89% and 85%, respectively).

The most spectacular variation of satisfaction rate is observed for hedge fund ETFs, with a decrease of 25% compared to last year. Since the beginning of our period of observation in 2006, the hedge fund ETF satisfaction rate has been one of the more volatile – a characteristic shared infrastructure ETFs, which we began observing in 2010. It clearly seems that the less liquid and less mature ETF markets experience the most varying levels of satisfaction. The rate of satisfaction for hedge fund ETFs clearly displays a saw tooth shape, with high figures in 2008,

Exhibit 4.33: Percentage of Total Investment Accounted for by ETFs or ETF-like Products

This exhibit indicates the percentage of total investment accounted for by ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey from 2008 to 2015.

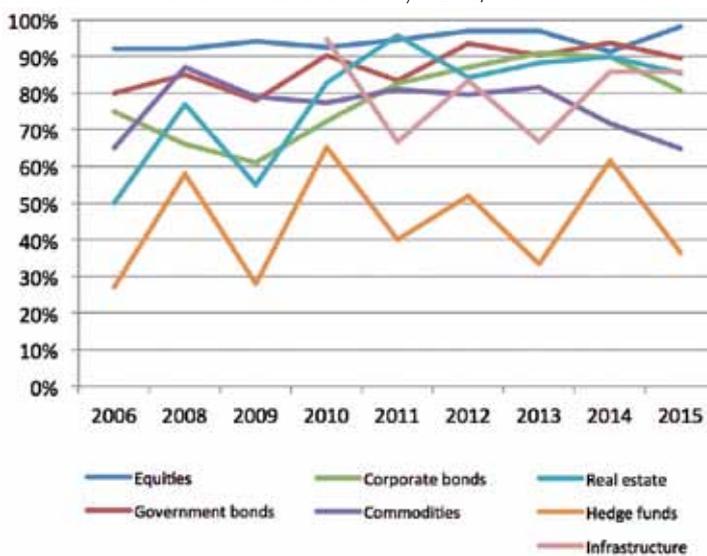


## 4. Results

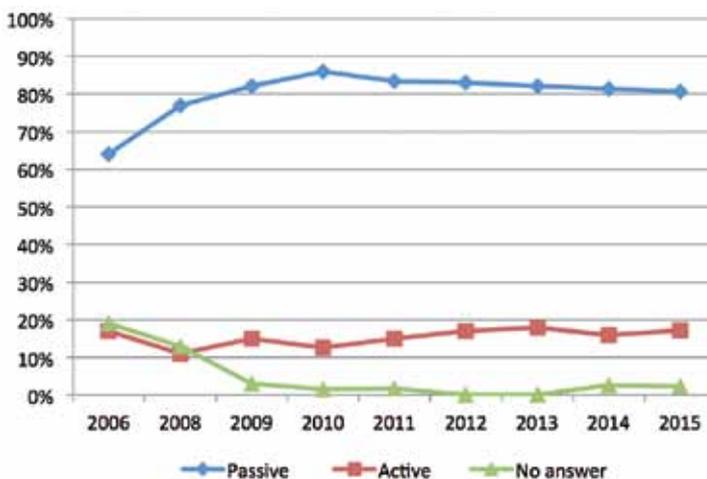
2010, 2012 and 2014 (58%, 65%, 52% and 62%, respectively) and lower figures in 2006, 2009, 2011, 2013 and 2015 (27%, 28%, 40%, 33% and 36%, respectively). This may be due to the suitability of ETFs to more liquid asset classes or the fact that investor expectations are still adjusting with regard to the benefits and drawbacks of ETFs based on those asset classes. For instance, we observed large variations through years in the number of users of ETFs for these two asset classes, as well as in the share of investment dedicated

to ETFs, with a decrease in the use of ETFs coupled with a considerable increase in the satisfaction rate, which may indicate that dissatisfied users have stopped using ETFs for these asset classes. Since 2014, the number of ETF users for these two asset classes, as well as the share of investment dedicated to ETFs has tended to show more stability, especially for infrastructure, which may explain why we are simultaneously observing a stabilisation in the satisfaction rate for infrastructure ETFs.

*Exhibit 4.34: Satisfaction with ETFs or ETF-like Products Over Time*  
 This exhibit indicates the percentages of respondents that are satisfied with ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.



*Exhibit 4.35: Preferred ETF type – active or passive?*  
 This exhibit indicates the preferred ETF types over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.



## 4. Results

However, it should be noted that the sample of respondents who indicated their level of satisfaction with infrastructure ETFs was very small, with only seven providing responses this year, similar to 2014. Similarly, the sample of respondents who answered whether or not they were satisfied with hedge fund ETFs was also quite small, with only 11 providing responses in 2015 and 13 in 2014. As a result, the impact of a single respondent having a change of opinion since last year has a considerable impact on the result.

When comparing the investors' preferences between actively- and passively-managed ETFs over time, Exhibit 4.35 clearly indicates that, for the time being, passive ETFs are likely to keep their predominance in the market. That said, there has been a slight decrease in popularity since 2010. This might be due to the change of questions since the 2011 survey.<sup>39</sup> We have observed high stability of the results from 2011. As noted in Section 4.1.5, the increased interest in actively-managed ETFs is at least partially due to investor interest in ETFs based on alternatively-weighted indices. The emergence of more innovative index construction schemes has led to a blurring of the line between what respondents consider to be active and passive ETFs. For instance, alternatively-weighted indices can be considered active in that their risk exposures and compositions are divergent to those of their cap-weighted counterparts. However, they are still passive in the sense that they do not involve discretion in the construction process and instead rely on a pre-defined set of systematic construction rules.

39 - We have added one option to that year's question (since 2011) so that investors are able to choose passive, active or both. When we constructed Exhibit 4.35, we counted respondents who answered both as 0.5 for passive and 0.5 for active. In this case, our results may be a little bit downward biased for passive replications since investors might prefer passive to active if there is only one option.

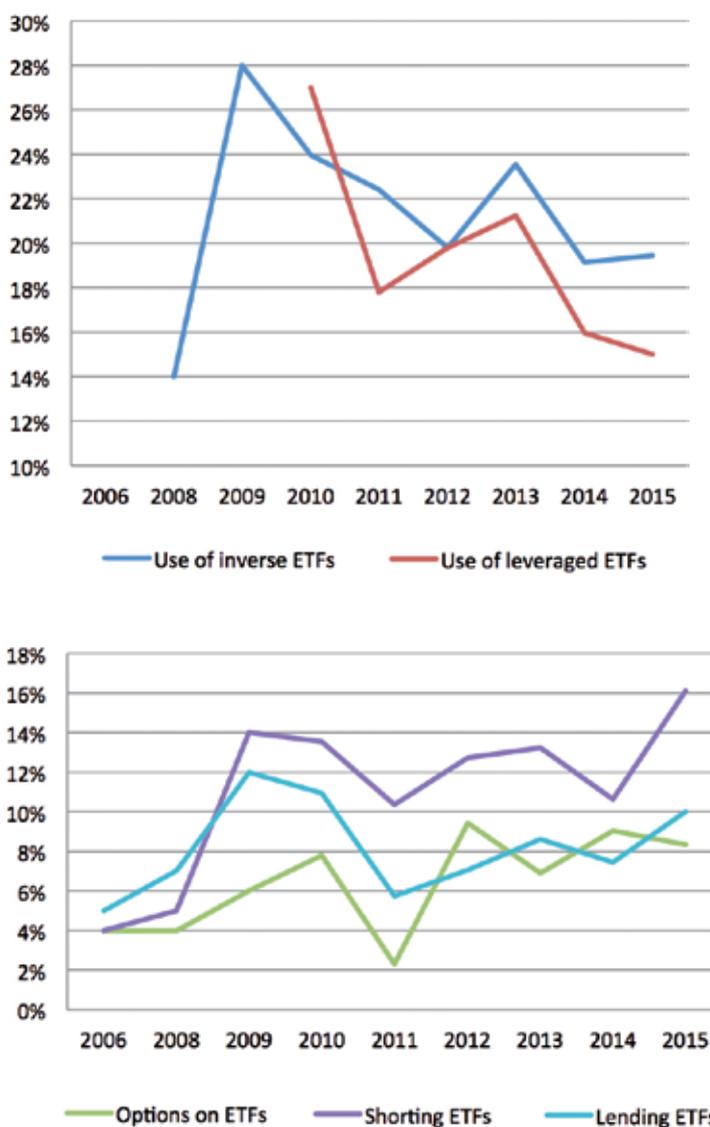
### 4.5.2. Developments in advanced uses of ETFs, challenges for total return swaps, and outlook on indexing products

Exhibit 4.36 shows the use of advanced forms of ETFs and advanced use of ETFs. Compared to last year, we observe a very slight increase in the use of inverse ETFs and a very slight decrease in the use of leveraged ETFs, after the significant decrease observed last year, which suggests that the number of respondents that use inverse and leveraged ETFs tends to become more stable after having encountered large variations. We also observe that the number of respondents who short ETFs tend to increase over the years, as well as the number of respondents who lend ETFs. However, shorting and lending ETFs were used by only 16% and 10% of respondents, respectively, in 2015. The use of options on ETFs by respondents has shown more limited progression for some years and is used by even fewer respondents, with only 8% making use of them in 2015.

## 4. Results

Exhibit 4.36: Advanced forms and advanced uses of ETFs

This exhibit indicates the use of advanced forms of ETFs (the graph on top) and advanced use of ETFs (the graph below) over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015. The use of inverse ETFs is not available for the year 2006 as these products were launched only after 2006. Moreover, the question for use of leveraged ETF is only available since 2010.



Finally, we also look at the expected developments of all four indexing products analysed in this survey, and compare the investors' expected usage of these products over time. The results are shown in Exhibit 4.37. The results suggest that despite the past growth and increasing maturity of the ETF market, investors are still looking to increase (or to at least maintain) their use of ETFs

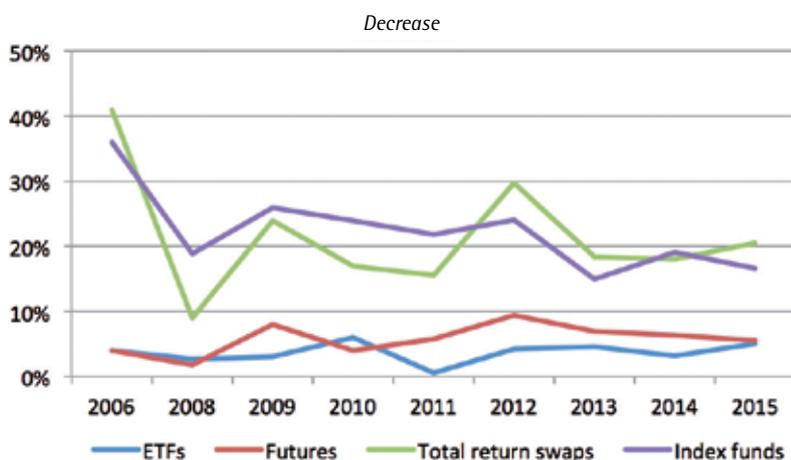
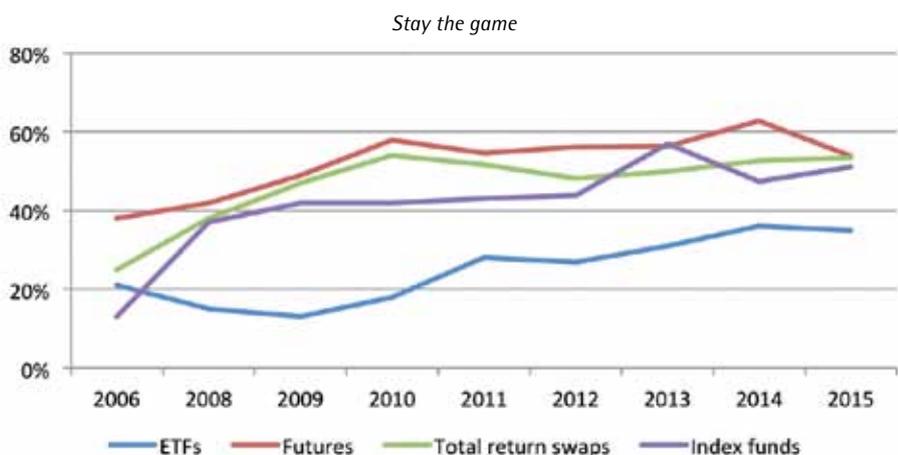
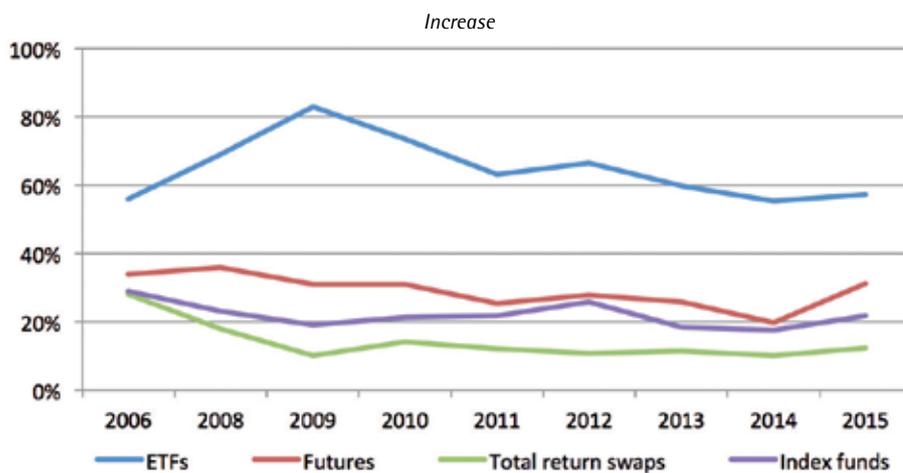
and have a more favourable outlook of their use than of their use of alternative indexing products.

In addition, respondents declaring that they plan to increase their use of ETFs were also asked about their motivations for planning such an increase. Results are displayed in Exhibit 4.38. It appears that increasing the use of ETFs will serve as a

## 4. Results

Exhibit 4.37: Will You Increase Your Use of the Following Indexing Products?

This exhibit indicates the future potential to change each of the mentioned products by investors over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2015.



## 4. Results

substitute to the use of active managers for a vast majority of respondents (74%, versus 64% in 2014), while 64% (versus 42% in 2014) of them will substitute them in favour of other index products.

These results are to be related with the deceiving performance of active management. Many academic papers were dedicated to the analysis of the ability of active management to deliver positive alpha and persistent performance. Among the recent studies, Barras, Scaillet and Wermers (2010), covering the period 1975 to 2006, found that more than 75% of actively managed US equity funds delivered a null performance after taking into account trading costs and expenses. Furthermore, 24% of the funds delivered negative alpha, while only 0.6% of them attained positive alpha after deducting fees. In addition, the authors noted a large decrease in the proportion of skilful managers over the past 20 years, with 14.4% of funds generating positive alphas in early 1990, compared with only 0.6% in late 2006. At the same time, an increase in the number of active funds generating negative alphas was observed, from 9.2% to 24.0%. In the same way, over the period from 1984 to 2006, Fama and French (2010) show that few active funds are able to produce returns high enough to compensate management fees.

In this context, investors may see the use of ETFs as more profitable and less costly than the use of active managers. ETFs allow investors to mimic the performance of all types of asset classes, including various smart beta products, while limiting costs. Indeed, investors are now offered a wide range of smart beta ETFs with the promise of achieving performance at lower costs compared to active management (Osterland, 2015).<sup>40</sup>

This hypothesis is confirmed as survey respondents declare that this replacement will first of all be motivated by costs for a vast majority of them (80%, vs 70% in 2014). The second motivation given by respondents is performance (50% of them, vs 45% in 2014), while transparency and liquidity are the last criteria given, with 46% (versus 37% in 2014) and 45% (versus 38% in 2014), respectively. These results confirm those of last year, where the question was asked for the first time, in terms of relative importance for the various occurrences. Furthermore, the results were even more pronounced this year as all percentages were higher than those obtained in 2014.

In a recent paper, Malkiel (2013) argues that a considerable increase has been observed in the costs of active management in the United States over the period from 1980 to 2011. However, it appears that the fees charged by active funds were not compensated by higher performance for active funds than for passive funds. Rather, the amount of underperformance of active funds relative to passive funds was largely equal to the difference in fees between active and passive funds. Any increase in costs is thus perceived as a further loss of performance for investors. In view of our survey results, it is possible that the preference for ETFs shown by investors (who perceive them as low-cost tools and who have a tendency to replace active funds with ETFs) constitutes a coherent response to the increase of fees in the management industry as described by Malkiel (2013). This is all the more likely given that the leading reason investors give as a motivation for increasing ETF use is cost (see Exhibit 4.38). Investors now seem to be well aware of the effect of costs on long-term performance.

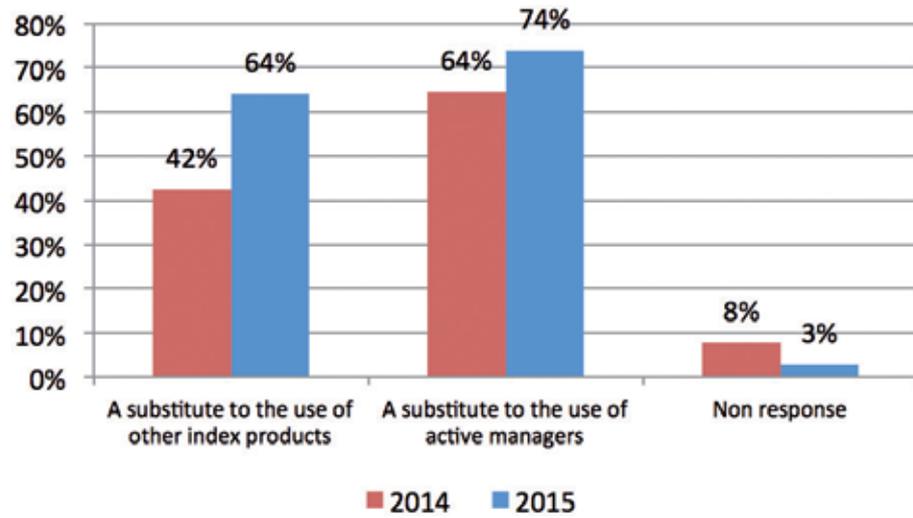
40 - <http://www.cnb.com/2015/10/06/smart-beta-and-stupid-fund-tricks.html>

## 4. Results

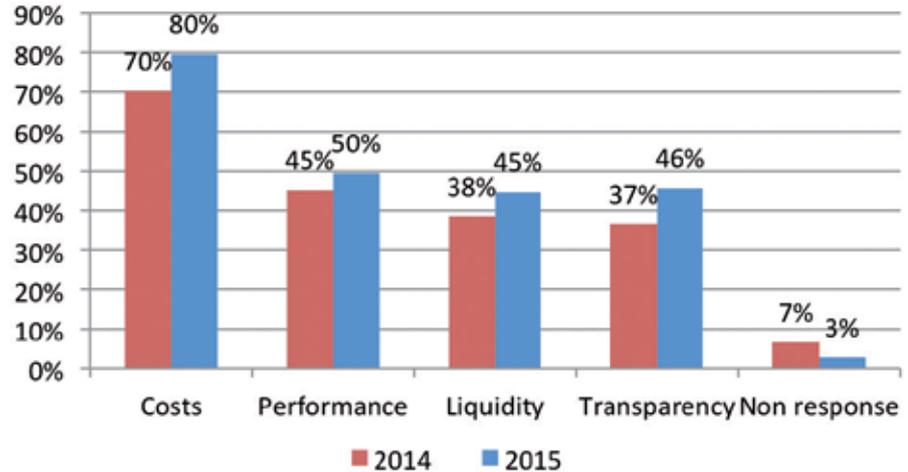
Exhibit 4.38: Increase in the use of ETFs will serve as...and will be motivated by...

These exhibits indicate the reasons and motivations given by respondents for planning to increase their use of ETFs. More than one response could be given.

Increase in the use of ETFs will serve as...



Motivations for increasing the use of ETFs



## 4. Results

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# About Amundi ETF, Indexing & Smart Beta



## About Amundi ETF, Indexing & Smart Beta

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Thanks to our long-standing experience combined with strong pricing power, we offer first-class replication on more than 100 indices to internationally renowned institutions.

The Indexing expertise is built on the search for value-added sources within a strict risk framework. It comprises a wide range of open-ended funds as well as having the capacity to implement customised mandates, including SRI and smart beta approaches.

In the ETF segment, Amundi has also successfully become a major player thanks to its strategy of competitive prices, innovation and high-quality tracking.

Amundi ETF, Indexing & Smart Beta has an experienced team of dedicated index fund managers based in Europe and Asia, with a recognised track record, and who benefit from Amundi's bargaining power and the excellence of its research teams.

# About EDHEC-Risk Institute



# About EDHEC-Risk Institute

Founded in 1906, EDHEC is one of the foremost international business schools. Accredited by the three main international academic organisations, EQUIS, AACSB, and Association of MBAs, EDHEC has for a number of years been pursuing a strategy of international excellence that led it to set up EDHEC-Risk Institute in 2001. This institute now boasts a team of close to 50 permanent professors, engineers and support staff, as well as 36 research associates from the financial industry and affiliate professors.

## The Choice of Asset Allocation and Risk Management and the Need for Investment Solutions

EDHEC-Risk has structured all of its research work around asset allocation and risk management. This strategic choice is applied to all of the Institute's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; taking extreme risks into account in portfolio construction; studying the usefulness of derivatives in implementing asset-liability management approaches; or orienting the concept of dynamic "core-satellite" investment management in the framework of absolute return or target-date funds. EDHEC-Risk Institute has also developed an ambitious portfolio of research and educational initiatives in the domain of investment solutions for institutional and individual investors.

## Academic Excellence and Industry Relevance

In an attempt to ensure that the research it carries out is truly applicable, EDHEC has implemented a dual validation system for the work of EDHEC-Risk. All research work must be part of a research programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the Institute's advisory board. This board is made up of internationally recognised researchers, the Institute's business partners, and representatives of major international institutional investors. Management of the research programmes respects a rigorous validation process, which guarantees the scientific quality and the operational usefulness of the programmes.

Six research programmes have been conducted by the centre to date:

- Asset allocation and alternative diversification
- Performance and risk reporting
- Indices and benchmarking
- Non-financial risks, regulation and innovations
- Asset allocation and derivative instruments
- ALM and asset allocation solutions

These programmes receive the support of a large number of financial companies. The results of the research programmes are disseminated through the EDHEC-Risk locations in Singapore, which was established at the invitation of the Monetary Authority of Singapore (MAS); the City of London in the United Kingdom; Nice and Paris in France.

EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs or major research projects:

- **ETF and Passive Investment Strategies, in partnership with Amundi ETF**
- **Regulation and Institutional Investment, in partnership with AXA Investment Managers**
- **Asset-Liability Management and Institutional Investment Management, in partnership with BNP Paribas Investment Partners**
- **New Frontiers in Risk Assessment and Performance Reporting, in partnership with CACEIS**
- **Exploring the Commodity Futures Risk Premium: Implications for Asset Allocation and Regulation, in partnership with CME Group**

## About EDHEC-Risk Institute

- Asset-Liability Management in Private Wealth Management, *in partnership with Coutts & Co.*
- Asset-Liability Management Techniques for Sovereign Wealth Fund Management, *in partnership with Deutsche Bank*
- The Benefits of Volatility Derivatives in Equity Portfolio Management, *in partnership with Eurex*
- Structured Products and Derivative Instruments, *sponsored by the French Banking Federation (FBF)*
- Optimising Bond Portfolios, *in partnership with the French Central Bank (BDF Gestion)*
- Risk Allocation Solutions, *in partnership with Lyxor Asset Management*
- Infrastructure Equity Investment Management and Benchmarking, *in partnership with Meridiam and Campbell Lutyens*
- Risk Allocation Framework for Goal-Driven Investing Strategies, *in partnership with Merrill Lynch Wealth Management*
- Investment and Governance Characteristics of Infrastructure Debt Investments, *in partnership with Natixis*
- Advanced Modelling for Alternative Investments, *in partnership with Société Générale Prime Services (Newedge)*
- Advanced Investment Solutions for Liability Hedging for Inflation Risk, *in partnership with Ontario Teachers' Pension Plan*
- Active Allocation to Smart Factor Indices, *in partnership with Rothschild & Cie*

- Solvency II, *in partnership with Russell Investments*
- Structured Equity Investment Strategies for Long-Term Asian Investors, *in partnership with Société Générale Corporate & Investment Banking*

The philosophy of the Institute is to validate its work by publication in international academic journals, as well as to make it available to the sector through its position papers, published studies, and global conferences.

To ensure the distribution of its research to the industry, EDHEC-Risk also provides professionals with access to its website, [www.edhec-risk.com](http://www.edhec-risk.com), which is entirely devoted to international risk and asset management research. The website, which has more than 70,000 regular visitors, is aimed at professionals who wish to benefit from EDHEC-Risk's analysis and expertise in the area of applied portfolio management research. Its monthly newsletter is distributed to more than 1.5 million readers.

### EDHEC-Risk Institute: Key Figures, 2014-2015

Number of permanent staff	48
Number of research associates & affiliate professors	36
Overall budget	€6,500,000
External financing	€7,025,695
Nbr of conference delegates	1,087
Nbr of participants at research seminars and executive education seminars	1,465

## About EDHEC-Risk Institute

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### Research for Business

The Institute's activities have also given rise to executive education and research service offshoots. EDHEC-Risk's executive education programmes help investment professionals to upgrade their skills with advanced risk and asset management training across traditional and alternative classes. In partnership with CFA Institute, it has developed advanced seminars based on its research which are available to CFA charterholders and have been taking place since 2008 in New York, Singapore and London.

In 2012, EDHEC-Risk Institute signed two strategic partnership agreements with the Operations Research and Financial Engineering department of Princeton University to set up a joint research programme in the area of asset-liability management for institutions and individuals, and with Yale School of Management to set up joint certified executive training courses in North America and Europe in the area of risk and investment management.

As part of its policy of transferring know-how to the industry, in 2013 EDHEC-Risk Institute also set up ERI Scientific Beta. ERI Scientific Beta is an original initiative which aims to favour the adoption of the latest advances in smart beta design and implementation by the whole investment industry. Its academic origin provides the foundation for its strategy: offer, in the best economic conditions possible, the smart beta solutions that are most proven scientifically with full transparency in both the methods and the associated risks.

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# EDHEC-Risk Institute Publications (2013–2016)

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